# MASTER THESIS REPORT

# Consumer utility analysis of Halal beef in The Netherlands:
# A Discrete Choice Experiment

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# Acknowledgement

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# List of abbreviations

CBC     : Choice-based conjoint
CVM     : Contingent Valuation Method
DCE     : Discrete Choice Experiment
FBO     : Food Business Operator
MNL     : Multinomial logit model
RPL     : Random Parameter Logit Model
RUT     : Random Utility Theory
WTP     : Willingness to Pay

# Summary

Halal is a dietary law observed by people following Islamic faith. Halal is considered as a type of credence food quality which cannot be easily assured by consumers even upon and after consumption. Therefore, Halal certification takes place as a practical tool for the consumers to make an informed choice.

This thesis report assesses the importance of attributes attached to Halal beef in the Dutch market, as well as to investigate consumer utilities and their willingness to pay (WTP) towards the desired Halal certification using Discrete Choice Experiment (DCE). Four most relevant attributes were selected i.e. slaughter method, traceability information, place of purchase, and Halal certification. Price was incorporated as an attribute to allow estimation of willingness to pay for Halal certification. There were 242 respondents completed the survey, from both Dutch (53%) and non-Dutch consumers (47%). As many as 69% and 31% were male and female, respectively. Vast majority of the respondents (95%) were within the age of 18-45 years old, with largest group being student (43%) followed by employee (30%) and housewife (12%). Majority of the respondents (76%) had disposable monthly income less than € 2,500, while the rest earned more than € 2,500.

The respondents assessed themselves having good knowledge on the studied attributes, except for traceability information with 62% of the respondents considered themselves not knowledgeable. The findings indicated that slaughter method was valued as the most important attribute, followed by Halal certificate, place of purchase, price, and traceability information. This order of importance varied across sociodemographic variables, except for slaughter method. Both Dutch and non-Dutch subgroups valued Halal certification as the third most important attributes. However, non-Dutch respondents valued it with higher importance (0,20) than their Dutch counterparts (0,16). For non-Dutch, price was more important than Halal certification. On the contrary, place of purchase was more important for Dutch respondents. It was rather surprising that male respondents were more price sensitive and master graduates perceived traceability information with lowest score.

The ideal product preferred by the consumers was Halal beef obtained without pre-slaughtering stunning, with traceability info, available at Halal store, certified by an official certifier, and sold at 2.75 euro per 500 gram. In general, an official Halal certifier was mostly preferred, but only slightly preferred than international certifier. However, consumers were not willing to pay for premium for any type of Halal certifiers, indicated by negative WTP of -0.73 €, -0.93 €, and -1,03€ for small, official, and international certifiers, respectively. This finding indicated that consumers tend to lose their utility when confronted with price. WTP estimates differ across socio-demographic variables with male and non-Dutch respondents had the lowest WTP.


**Keywords:** *discrete choice experiments, attributes importance, consumer utilities, Halal certification, willingness to pay*

# 1. Introduction

## 1.1. Background

Nowadays, we might come across some varieties of food products with a Halal label, either in a particular Halal shop or on supermarket's shelves. Halal, a short-term for *Halalan tayyiban*, is derived from an Arabic word linked to Islamic faith. In the context of food, it means permissible and lawful, safe and not harmful (Al-Qaradawi, 2007). It is a dietary law which is observed by Muslim on a daily basis. While *Halal* is mainly associated to what is permissible according to Islamic law, *tayyiban* means wholesome and covers very broad aspects such as safe, clean, nutritious, and quality, which is primarily contributed by food safety measures (Sani & Dahlan, 2015)

Initially, Halal was mainly referred to the method of slaughtering particularly for livestock and poultry. However, as the food processing technology progressed over the centuries Halal is now also a concern for other products such as dairy, bakery, snacks, and other processed food products. Therefore, Halal assurance expands from farm to fork and requires Halal compliance along the entire supply chain (Evans & Syed, 2015).

The volume of the global Halal food market shows a rising trend and continues to rise along with the growth of the Muslim population. In 2015, it was estimated to account for USD 1,17 trillion, representing 16,6% of the global food industry (Thomson Reuters, 2015) and feeding nearly 1,8 billion people worldwide (Dar, Azmi, & Rahman, 2012). Nearly 850 thousands Muslims are living in The Netherlands, accounting for 5% of the Dutch population (CBS, 2016). This number is higher when the number of temporary Muslim residents who do not hold Dutch citizenship, such as students, expatriates, asylum seekers, etc. is taken into account.

Along with the development of the global Halal food industry, the European food industry also take parts in Halal food production, either for local consumption or export to Muslim countries (van der Spiegel et al., 2012). However, despite the strict standards for food quality and safety in the European Union (EU), Halal is not regulated either in the EU or the Netherlands (Havinga, 2011) and regarded as a religious concern in which governments should not play a role (Tieman, 2017).

Beef is a food product that is regularly consumed by Muslims. However, meat and meat products often become the subject of food fraud. Frauds in the Halal meat industry mainly involve deliberate mislabelling of non-Halal meat as Halal and cross-contamination with non-Halal substances (for example pork and its derivatives) (Fuseini, Wotton, Knowles, & Hadley, 2017). Halal food consumers may not be aware of their vulnerability, as Halal is a typical credence quality which cannot be assured by consumers upon and after consumption (Bonne & Verbeke, 2007). In the absence of the governmental role in Halal regulation, private initiatives take place to provide Halal assurance by issuing Halal certification which is considered essential to protect the consumers from unfair practices or misleading information.

Currently, limited research has been done in the field of Halal food in the Netherlands, including the importance of Halal certification as perceived by the consumers and the link between Halal and food safety. Therefore, it is interesting to investigate consumers utilities of Halal beef, as well as the desired level of Halal certification and consumers' willingness to pay (WTP).

## 1.2. Research objectives and research questions

The main objectives of this research are to investigate the relative importance of Halal beef attributes, followed by consumers utilities of Halal beef, and the willingness to pay for the desired Halal certification for beef in the Dutch market.

Nowadays, consumers tend to rely on Halal labelling or certification and thus the hypothesis was set forth that Halal certification would be one of the attributes that should be possessed by Halal beef (Havinga, 2011). In order to accomplish the research objectives, the following research questions were formulated:

1. What is the relative importance of attributes for Halal beef in the Netherlands?
2. What is the consumer utility for Halal beef in the Netherlands?
3. How much are consumers willing to pay for Halal certification in beef?

# 2. Literature review

## 2.1. Halal principles

Food can be claimed as Halal when it conforms to Halal criteria referring to the nature, origin, and processing methods (Bonne & Verbeke, 2008). Criteria of Halal are specifically mentioned in Quran[1] and further explained in the Hadith[2]. Generally, Muslims are permitted to consume any food and drink as long as they do not fall under the category of prohibited (*haram*) food, which include carrion (dead animals), blood, pig and its derivatives, intoxicants (alcohol and drugs), carnivorous animals with fangs, birds with sharp claws (bird of prey), land animals (such as frog and snakes), and animals slaughtered without Islamic rites (Riaz & Chaudry, 2004).

Meat-based product is considered to be the most strictly regulated product as the requirements expand from pre-slaughtering until the meat arrives at the consumers' hand (Bonne & Verbeke, 2008). Halal aspects of meat also cover the humane treatment of the animals, such as avoiding overloaded animals on the truck during transport and slaughtering should be done with minimal pain for the animals. Furthermore, it expands to how the meat is slaughtered and processed.

### 2.1.1. Halal legislation

Legislation concerning Halal food varies at the global level. Muslim-majority countries, such as Malaysia and Indonesia, have high stakes in Halal food production and consumption. Thus, legislations were set up to provide Halal assurance, such as Law No. 33/ 2014 laying down Halal product assurance in Indonesia and Halal Assurance System (HAS) 2011 in Malaysia.

In addition, some Muslim-minority countries such as Australia and New Zealand also issued legislation with regard to Halal primarily for exported products, namely Meat Notice 2009/08 laying down the guidelines for export of red meat and red meat products in Australia, and General Export Requirement for Halal material and Halal animal products 23 December 2016 in New Zealand.

Meanwhile, within the EU and The Netherlands governmental regulations for labelling and certification for religious dietary laws such as Halal and kosher are absent (Havinga, 2011). While it is explicit that EU General Food Law Regulation (EC) 178/2002 was designed to guarantee the quality and safety of food consumed in the EU, including the protection of the consumers against deceptive or fraudulent activities in food trade by providing rationales for decision making with regard to their food consumption, Muslim consumers are not facilitated with respect to Halal assurance.

### 2.1.2. Halal standards and certification

In general, Muslim population is divided into four major schools of thought (*madhab*) namely Hanbali, Hanafi, Maliki, and Shafii, which set the basis of Islamic jurisprudence (Bassiouni, 2012). These groups might differ with regard to Halal criteria, particularly for slaughter method and some ingredients (Fauzi & Mas'ud, 2009 in van der Spiegel et al., 2012). Muslim-majority countries usually follow certain *madhab* and set their own Halal standard.

Currently, there is no convention for Halal standards on the worldwide level. At the European level, European Committee for Standardization (CEN) tried to formulate such standard but it was not successful (Demirci, Soon, & Wallace, 2016). Meanwhile, at global level, World Halal Food Council (WHFC) was founded in 1999 to work towards a unified Halal standard. However, by far it has not yet accomplished its paramount vision to establish such a global standard.

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[1] The holy book of Islam
[2] A recorded compilation of Prophet Muhammad's life, actions, and teachings

The only global standard on Halal is set by CODEX CAC/GL 24-1197 laying down the guidelines to use the term "Halal" for food labelling (CAC, 2001). However, this guideline left ambiguity regarding the interpretation of the lawful/ unlawful animals and slaughtering process according to different school of thought. Pre-slaughtering stunning is one of the most debated issues among Muslim communities, particularly in Western countries. The divergent opinions on Halal interpretation are considered an obstacle for the development of global Halal food industry (Noor & Noordin, 2014) and the existing gaps in Halal certification and regulations are considered as a potential risk to fraudulent activities in Halal food market (Fuseini et.al., 2017).

As a type of credence quality, Halal cannot be easily assured by the consumers either upon or after consumption (Bonne & Verbeke, 2007). It is comparable with other food products qualified to their production methods, such as fair trade or organic products. Havinga (2011) suggested that consumers have three options to make sure that the purchased products are genuinely Halal: 1) buying from someone with a reliable reputation such as Islamic butchers or shops, 2) asking a religious leader with regards to permitted food, and 3) buying products with a Halal label. However, the rising number of manufactured foods and the globalization of food chains have added complexities to the assurance of Halal status. Moreover, in Muslim-minority countries such as EU countries, there is a higher probability of cross-contamination between Halal and non- Halal products particularly during processing, storage, and transport stages due to lack of knowledge of the Food Business Operators (FBOs) (Fuseini et al., 2017). Therefore, nowadays consumers would prefer to rely on Halal labelling to ensure that the products are genuinely Halal(Havinga, 2011).

In Muslim-majority countries, governments are involved in Halal governance by establishing Halal authority and implementing Halal legislations. The authority serves as official certification body as well as accreditation body for foreign Halal certifiers, for example JAKIM (Department of Islamic Advancement of Malaysia), MUI[3] (Indonesian Council of Ulama), MUIS (Islamic Religious Council of Singapore), and GCC (Gulf Cooperation Council comprises of Kuwait, Bahrain, Saudi Arabia, Qatar, United Arab Emirates, and Oman).

Van Waarden & van Dalen (2010) argued that the circumstances in the Netherlands with the inexistence of public regulation have stimulated initiatives from private parties to establish Halal certification bodies. Currently there are 30-40 Halal certifiers which can be distinguished into three main groups: 1) small certifiers, consists of individual certifiers (local imams) and self-certifiers business (such as *Mekkafoods*, local *uncle-aunty* shops), 2) official certifiers (such as Halal Correct, Halal Quality Control (HQC), Halal Feed and Food Inspection Authority (HVV)), 3) international certifiers (such as JAKIM, IFANCA, IHI Alliance). These Halal certifiers are operating under the supervision of different Islamic authorities such as the Association of Dutch Imams, Majlis al Ifta, or foreign Halal certification bodies such as JAKIM or MUI (van Waarden & van Dalen, 2010).

Some Dutch Halal certifiers (for example HQC, Halal Correct, HVV) are accredited by reputable Halal certifiers such as JAKIM and MUI (JAKIM, 2017; MUI, 2017). Muslim majority countries, for example Malaysia and Indonesia, only recognise Halal certificates of which the standards adhere to their standards. FBOs certified by Halal certifiers accredited by those aforementioned bodies have benefits to export their products to the respective countries. However, Dutch Halal certifiers are not recognised by the Dutch Accreditation Council (*Raad voor Accreditatie*) because they do not possess written

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[3] In October 2017, the Government of Indonesia has revoked the sole authority of MUI to issue halal certificate. The role of issuing halal certificate is replaced by Halal Product Certification Agency (BPJPH) while MUI will still have the authority to issue Halal edicts *(fatwa).*

documents containing requirements for certification such as international standards (ISO) or European standards (EN) which are used to assess the conformity of the certification bodies (Havinga, 2011).

In the Netherlands, each Halal certifier can adopt standards which may vary from one to another. An overview of four main official Halal certifiers in NL, as summarized from their websites and other literatures, is presented in Table 2. 1 below.

Table 2. 1. Overview of four main official Halal certifiers in the Netherlands

| Halal Certifiers | Positions in different aspects | | | |
| --- | --- | --- | --- | --- |
| | International recognition | Pre-slaughtering stunning | Strictness | Customers |
| HVV http://www.halal.nl/ | MUI, JAKIM[1] | Not in favour [2] | Very strict[2] | Mostly international companies[2] |
| Halal Correct http://www.halalcorrect.com/ | MUI, JAKIM[1] | NA | NA | Domestic market and exporting companies [2] |
| Halal Quality Control http://halaloffice.com/ | MUI, JAKIM, MUIS, CICOT[1] | In favour [2] | Less strict[2] | Albert Heijn [2] |
| Halal International Control http://hic-quality.com/ | None | In favour [2] | Relaxed [2] | Domestic markets such as Albert Heijn, Jumbo, Vomar [2] |

[1] (Halal Quality Control, n.d.; JAKIM, 2017; LPPOM MUI, 2017)
[2] (van Waarden & van Dalen, 2010)

It can be seen from Table 2. 1 that each Halal certifier has different position towards certain aspects depending on the standards it follows. The practice of certification varies between the level of strictness. The less strict a Halal certifier, the less credible it is and the higher the risk of the product for being not genuinely Halal. Fuseini et al., (2017) argued that the absence of government's involvement in regulating Halal standards will allow incompetent parties with either technical or religious knowledge to establish a Halal certification body. Halal certification bodies will tend to be profit-oriented parties who seek money from companies in need of Halal certificates to convince their consumers.

## 2.2. Halal beef in the Netherlands

Beef is meat obtained from bovine animals older than one year old, while meat from younger animals is named veal. Beef is primarily produced from cattle breeds which are specifically grown for their meats, although it can also be produced from dairy cattle (Eurostat, 2017). Beef supply in the Netherlands comes from both domestic production and import from EU countries and third countries. Beef production in the Netherlands is mainly from dairy cows (OECD, 2006).

In 2016, the trade balance for bovine meat was positive, which means that the Netherlands exported more products than it imported. The majority of the products traded is fresh/ chilled meat representing 92% of exported and 88% of imported value (Trade map- International Trade Statistics, n.d.) (see Table A.1 and A.2 in appendix A to see the trade data). Germany is the main trade partner for either export and import for both kind of meats. The top five exporters to Netherlands are Germany, USA, Argentina, Uruguay, and Ireland, contributing to 50% of total imported products. However, there is no data available with respect to the number of Halal beef exported or imported from/ to the Netherlands.

The demand for Halal products, including beef, in the Netherlands is expected to grow due to three main drivers: 1) high growth rate of Muslim population; 2) increasing financial capacity of Muslim households tend to raise their budget for food; 3) rising awareness for genuinely Halal products particularly in young generations (van Waarden & van Dalen, 2010).

The Belgian Ministry of Agriculture and Fishery estimated that in 2013 the Dutch Halal markets was worth € 2,7 billion (Speetjens & DinarStandard, 2016). However, it is difficult to estimate the number of Halal beef supply and demand in the Netherlands due to lack of data on how much the meat constitutes to the total Halal food consumption.

## 2.2.1. Supply chain of Halal beef

The general beef meat supply chain is depicted in figure 2.1. This figure is adapted from the Australian beef chain (Bryceson & Smith, 2008), however it is likely that it has the same pattern as in the Netherlands. As can be seen from Figure 2. 1, the beef supply can be sourced either from the domestic or global market. There are a number of Halal abattoirs in the Netherlands. However, the percentage of domestic and imported cows supplied to these slaughterhouses is unknown.
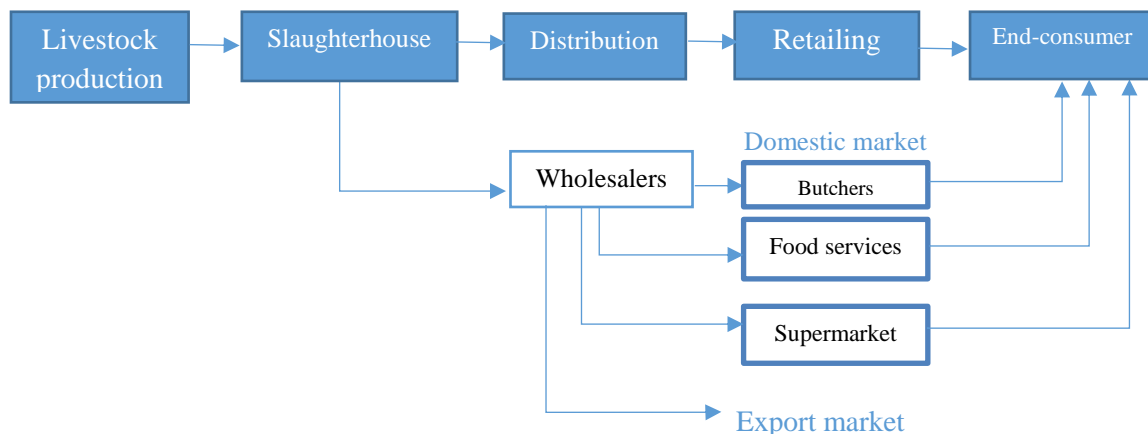


Figure 2. 1. Beef supply chain (Bryceson & Smith, 2008)

Meat is considered to have the most stringent Halal requirement compared to other food products. It is not only determined by the nature of the animals (such as pig is haram by nature) but also by the production process (such as cows slaughtered without observing Islamic rites is not Halal, although the cow itself is Halal by nature). In comparison to processed meat products, fresh meat has lower chance to become non-Halal because it does not undergo manufacturing processes. There are at least two critical points for fresh meat:

1. Ritual slaughtering process
   Halal as a credence quality is mainly attributed to this stage. It is equivalent to other credence attributes which refer to the production methods (Soon, Chandia, & Regenstein, 2017).

2. Contamination with haram substances during transportation
   In Muslim-minority countries in which Halal products are less likely to get separate equipment or facilities, one important concern is the risk of contamination with haram product during transportation and storage, such as pork. Therefore, Halal logistic plays a crucial role to ascertain the trustworthiness toward Halal certified brands (Tieman, Ghazali, Vorst, Tieman, & Ghazali, 2013). This risk can be reduced if the meat is produced and consumed locally. For example, some Halal abattoirs have their own facilities and transporting fleet to deliver to Halal stores directly.

Van Waarden and Van Dalen (2010) distinguished two Halal market channels, according to their consumers, producers, and certifiers:

a. Local *Uncle- Aunty* market

This kind of store operates locally, is family owned, and small scale. The term "*uncle-aunty market*" is because the shops usually sell a diverse variety of Halal food to the members of a certain ethnicity on the basis of personal trust, although the meats sold may be not Halal certified.

In the Netherlands, these shops are also often referred as "Halal store" or "Turkish/ Moroccan store". However, the consumers of this type of market have developed into a wider society, not necessarily people from the same ethnic group as the owner. This is probably because Muslim-owned stores are more preferred by Halal consumers and the fact that they also sell other exotic products which may be difficult to find in mainstream supermarkets.

b. Professional international Markets

This type of market includes supermarket chain operating on a large scale, such as Albert Heijn, Jumbo, etc. They are characterised by big scale operation and rely on Halal certification on products to attract consumers.

### 2.2.2.     Halal fraud and problems in the market

Halal status of a product is determined since the initial stage of processing until the product is ready at the point of sales. It can be complicated because each stage can be performed by different business entities. It is also important to emphasize that Halal is a type of process standard, not product standard in which any unlawful practice during the farm to fork stages will render the product from Halal to haram. Therefore, Soon et.al. (2016) argued that the whole supply chain from farm to fork needs to uphold a Halal integrity by assuring that the product is safe, of good quality, and free from malpractices, such as mislabelling, cross-contamination, etc.

In the Netherlands, a variety of Halal products are also available in the supermarket chains, which mostly are meat-based products. However, the availability of Halal products in the supermarket shelves is not without problems and challenges. In 2006, not long after introducing a new line of Halal product, Albert Heijn was protested by animal rights organisations for selling meats from non-stunned animals. As an immediate response, Albert Heijn shifted to another Halal certifier which was in favour for pre-slaughtering stunning. But, this strategy turned the Halal consumers away because some of them do not consider such type of meat to be Halal (Havinga, 2011). This example showed that the Halal meat chain in Europe is adapted and influenced by new consumers trend such as animal welfare (Bonne & Verbeke, 2006).

Beef (and other meat) continues to be the subject of food fraud since the past decades, including mislabelling and adulteration. In 2009, the Dutch Ministry of Agriculture revealed that a Dutch wholesaler committed food fraud by selling mislabelled Halal meat to Muslims in French. On January 2010, a Dutch TV program revealed that one of 10 samples of products claimed as 100% lamb kebabs bought from different snack stores actually contain 100% pork. Only one sample was made of 100% lamb, while the rest contained mutton, beef, turkey, and chicken (van Waarden & van Dalen, 2010). During the year 2000 to 2016, 16 worldwide cases of incorrectly labelled products were reported (Soon et al., 2017). The findings were based only on scientific journal database. If other cases occurred but not reported into scientific journals, the actual number might be higher.

## 2.3. Consumers characteristics

In this section, an overview of Dutch Muslims and Halal consumers in Dutch market is elaborated.

### 2.3.1. Characteristic of Dutch Muslims

The majority of Muslim in the Netherlands has migrant backgrounds and various ethnic or national origins. In 2007, Turkish and Moroccan descents were estimated to represent 69% of the Muslim population in the Netherlands. The rest of the population is comprised of the following backgrounds mentioned in order according to their number: Suriname, Afghanistan, Iraq, Somalia, Pakistan, Iran, Native Dutch, Egypt, Indonesia and Tunisia (van Herten, 2007).

The Dutch Muslim population has an almost equal percentage of men and women which are 52% and 48% respectively. Approximately 80% of them live in urban municipalities, with provinces Flevoland, Utrecht, North Holland, and South Holland having the largest populations. First generations of Turkish and Moroccan are less educated as compared to those who came from Iraq, Iran, and Afghanistan due to their different immigration background (FORUM, 2010).

Studies on the behaviour of Dutch Muslims are mostly conducted on Turkish and Moroccan descent due to their significant numbers. Based on a study in 2009 and 2011, 80% of Turkish and 94% Moroccan consume Halal food on a daily basis, while Muslim from other backgrounds such as Afghanistan, Iraq, and Iran showed lower percentage (Maliepaard & Gijsberts, 2012).

### 2.3.2. Characteristics of Halal consumers

Van Waarden and van Dalen (2010) identified four types of Halal consumers namely "natural", "conscious", "western" and "ignorant" consumers. The first category exists in Muslim countries, and the others exist in Muslim-minority countries. *Natural* consumers are hardly aware of non-Halal food as this kind of food may not be ubiquitously available in the country. *Conscious consumers* are aware of their Halal consumption because they know that a lot of food in the country are not Halal. *Western Halal consumer* refers to the consumer who focuses on healthy, high-quality or pork-free food, and not necessarily a Muslim. Meanwhile, *ignorant Halal consumers* are those who consume Halal food without knowing it because the meat industry often shifts to Halal production to achieve economy of scale. Some supermarkets, mainly in the UK and New Zealand sell meat obtained from Halal abattoirs in order to serve larger group of consumers in which the products are sometimes displayed without Halal label (Poulter, Adams, Ledwith, & Chorley, 2014).

Van Waarden and Van Dalen (2010) also argued that Muslim consumers' behaviour towards Halal food in Western countries is influenced by various factors, such as ethnicity, religious denomination (*madhab*), immigrant generation, education background, and religious strictness. This argument was also supported by Bonne and Verbeke (2008). In addition, religious strictness refers to the degree a Muslim adheres to Islamic values and practices. Some people are satisfied with not consuming pork and alcohol, some others are willing to spend more time to check all the food ingredients, particularly for ingredients with higher risk of being haram such as food additives. Some people might go further by checking the method of slaughtering, such as whether the animals were stunned prior to slaughter.

## 2.4. Discrete Choice Experiment

Choice experiment analysis is based on the Random Utility Theory (McFadden, 1974) and Lancaster's theory of characteristics of a good (Lancaster, 1966) and neoclassical economics (Manski, 1977). The Lancaster's theory implies that a good consists of a set of attributes and its values is a function of each attribute of the pertaining good. Neoclassical economic theory assumes that an individual ranks alternatives in a clear and consistent manner. Therefore, one can determine his/ her best choice and repeat it under equivalent circumstances (Anderson et. al., 1991 in Kjær, 2005).

In general, choice experiments can be exercised in three different ways i.e. discrete choice experiment (DCE), contingent ranking, and contingent rating. In contingent ranking or rating, respondents are asked

to rank or rate, respectively, a set of alternative products (Kjær, 2005). In DCE, the respondent has to choose one out of a number of alternatives which matches best to his/ her preference.

DCE was initially developed in the 1970s to gain insights into consumer behaviour and to assist market researchers to predict sales of newly developed products (Kjær, 2005), including food products. In DCE, a product is described by a number of attributes with each attribute having different levels. The combination of various attributes in different levels will construct an alternative product. Several alternatives are placed in a choice set in which a respondent has to select only one alternative. It also enables to investigate the individual's response to changes in attributes' levels and capture the valuation of a good to the extent of the importance of product attributes, consumer utilities, and WTP for attribute of interest (Kjær, 2005).

### 2.4.1.    Random Utility Theory

Consumer utilities depend on the values a consumer attaches to product attributes. Random utility theory (RUT) assumes that an individual acts rationally and chooses an alternative which best matches with his/ her preference or offers the highest utilities (McFadden, 1974). Therefore, consumer's decision making is encouraged by utility maximization.

Consumer utilities cannot be fully observed because there are random components which a researcher cannot or does not observe. RUT assumes that utility (U) consists of observed components ($V$) and stochastic or random components ($\varepsilon$). The utility of an individual $i$ for an alternative $j$ within a choice set is formulated as:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \tag{1}$$

The utility function can also be expressed as a linear combination of the observed attributes (x' = $x_1$, $x_2$, $x_3$,...$x_H$ ) with their parameter estimates ($\beta = \beta_1, \beta_2, \beta_3, ... \beta_H$ ):

$$U_{ij} = x'_{ij}\beta + \varepsilon_{ij} \tag{2}$$

When an individual $i$ is facing a choice set $C$, consisting of $k$ options, the probability of the individual $i$ to choose alternative $j$ is equal to the probability that the utility of alternative $j$ ($U_{ij}$) is higher than or equal to the utilities of all other alternatives available in the choice set.

$$P_i(j|C) = P\left[ \left( x'_{ij}\beta + e_{ij} \right) \geq \left( x'_{ik}\beta + e_{ik} \right) \right], \forall_k \in C \tag{3}$$

$k$ = all alternatives in choice set C

There are numerous models to analyse choice experiments, such as Multinomial Logit Model (MNL), Nested Logit Model, Probit Model, Random Parameter Logit Model (RPL) and Latent Class Model. These model are based on different assumptions on the probability distribution of random/ unobserved utility ($\varepsilon$) (Vojáček & Pecáková, 2010).

### 2.4.2.    Multinomial Logit Model

The Multinomial Logit Model (MNL, also termed as Conditional logit model (Kjær, 2005)) assumes that the unobserved utilities are *independent and identically distributed* (IID) with type I extreme value or Gumbell distribution (Haaijer, 1999; Vojáček & Pecáková, 2010; Bhat, 2002). The choice probabilities of alternative j from choice set $C$ consists of $k$ alternatives for individual $i$ with the MNL model is calculated as follows (Kuhfeld, 2000):

$$P_i(j|C) = \frac{\exp(U_{ij})}{\sum_{n=1}^{k} \exp(U_{in})} = \frac{\exp(x'_{ij}\ \beta)}{\sum_{n=1}^{k} \exp(x'_{in}\ \beta)} \tag{4}$$

The probability of individual $i$ to choose alternative $j$ from choice set $C$ is the exponential of the utility of alternative $j$ divided by the sum of the exponential utilities of all available alternatives. Next, parameter estimates or part-worth utility for each attribute is computed by finding the maximum value of the log-likelihood as follows (Haaijer, 1999):

$$l = \sum_{i=1}^{I} \sum_{j=1}^{k} y_{ij} \ln(P_{ij}) \tag{5}$$

$y_{ij}$ is the observed choice, $y_{ij}$ is 1 when its utility is higher than any other alternatives in the choice set, and 0 when it is otherwise. Part-worth utility represents the preferences of the respondents with respect to an attribute's level.

### 2.4.3.        Willingness to pay estimation

Willingness to pay is generally described as the maximum amount of money an individual is willing to spend for a specific good or service (Breidert, 2005). WTP is defined more precisely as the amount of money an individual is willing to spend for an improved or additional attribute (Verbeke, et. al., 2013). As a type of credence quality, just like with other process standards, such as organic or fair trade, Halal is prone to information asymmetry in which the seller or producer usually knows more about the product than the consumers. Therefore, Halal certification is considered an important and practical tool to allow consumers to make an informed choice. Based on this rationale, Halal label can be considered as a premium quality and may entail an additional cost. Thus, it is relevant to measure WTP for Halal certification labelling.

WTP can be estimated by various different methods, primarily divided into (a) revealed preferences (such as by observing actual market transaction) and (b) stated preference (such as Contingent Valuation Method (CVM) and DCE). In stated preference methods, respondents are asked to make a choice over a hypothetical scenario instead of observing their actual buying behaviour. This method is usually preferable due to budget constraint and time limitation of a research (Van Loo, et.al., 2011). Furthermore, the stated preference method is highly recommended for a product, service, or policy which is not yet existing in real life, or if the objective is to investigate preferences among existing available products (Ali & Ronaldson, 2012).

In the field of food safety, initially CVM was frequently used to estimate WTP for a certain product attribute or food safety measure (Enneking, 2004). CVM investigates the value of a good by asking the respondents about their WTP for the respective product through an open ended question. For example, by directly asking their WTP for traceability information on the food package. However, CVM puts the attribute of interest as the centre of attention and might not reveal the value of other attributes which make up the good as a whole. Therefore, this method can affect respondents' perception towards the measured attribute as socially desired by the society and may result in an overestimation of WTP compared to real behaviour (Meyerding, 2016).

On the contrary, DCE allows respondents to evaluate multiple attributes which make up the good. By assessing different attributes, respondents inevitably have to make a trade-off between one attribute to another. Thus, CE can estimate relative utility of each attribute towards other measured attributes of a certain good without emphasizing on a single observed attribute.

Currently, DCE is widely used to assess the relative utility and WTP of food attributes, for instance a quality and safety label of meat products in German (Enneking, 2004), food safety labelling of beef steak in the US (Loureiro & Umberger, 2007), organic chicken breast (Van Loo, et.al., 2011), food safety assurance labels of beef in Ghana (Owusu-Sekyere, et.al., 2014), traceability of pork meat in China (Wang, et.al.,2014), hormone-treated beef in Norway (Alfnes, 2004).

# 3. Methodology

A literature review was performed to build theoretical backgrounds and collect required data for conducting DCE. DCE was chosen for this study for its practicality and familiarity for the respondents compared to other methods, namely choice ranking and rating. In addition, it is able to assess multiple attributes simultaneously without emphasizing on a certain attribute, in this case Halal certification. This chapter mainly discusses the steps in conducting DCE which can be divided into several steps, i.e. identification of attributes and levels, experimental design, questionnaire construction, data collection, and data analysis as depicted in Figure 3. 1 below (Kjær, 2005).
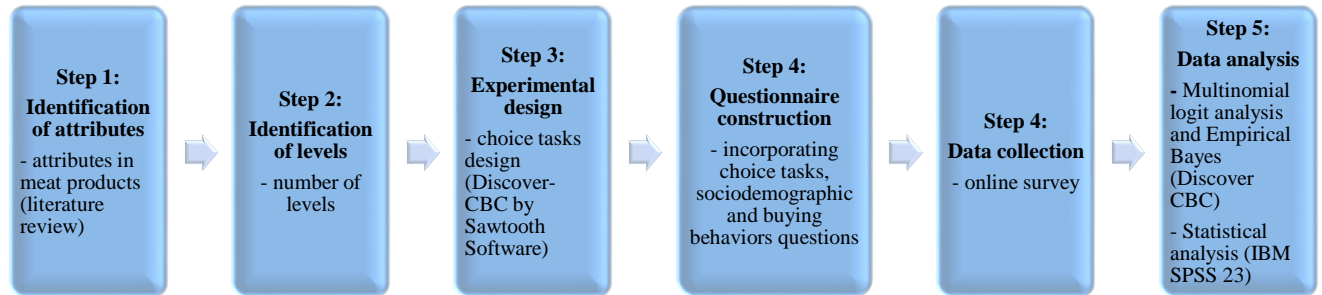


Figure 3. 1. Stages in Discrete Choice Experiment

## 3.1. Survey design

The first three steps of DCE were classified into one group and called *survey design*.

### 3.1.1. Identification of attributes

There are at least two considerations in identifying product attributes, namely relevancy and importance (Kjær, 2005). An attribute is considered as relevant if by ignoring it would alter the conclusion, and irrelevant if it is omitted would not affect the conclusion. Moreover, an attribute should be meaningful and important to the respondents (Bennet & Blamey, 2001 in Kjær, 2005).

Identification of attributes can be sourced from literature reviews, group discussions, interviews and expert opinions. In this study, literature review was held to collect attributes of beef or other meat products, not necessarily only for Halal meat. Numerous studies were conducted to analyse the consumers' preferences in meat products regardless their study objectives, such as for food safety related attributes (Loureiro & Umberger, 2007; Owusu-Sekyere et al., 2014; Wang, et.al.,2014; Aizaki, 2004c in Aizaki, 2012), and production system (Verbeke et al., 2013). These studies were collected through various research databases such as Google Scholar and Scopus as shown in Table 3. 1 below.

Table 3. 1. Attributes and their levels in meat products from past studies

| No. | Attributes | Number of attributes level | Research Objectives | Methodology | Country | References |
|---|---|---|---|---|---|---|
| 1. | Price, traceability, country of origin label, food safety inspection | 2 | To measure WTP for ribeye beef steak in respect of different origin and food safety related labelling program | DCE with MNL. Two alternatives products and no-choice option per choice set. | US | (Loureiro & Umberger, 2007) |
| 2. | Hygiene, freshness, taste, Islamic production method (slaughter method), Muslim ownership of the outlet | - | To analyse Halal quality coordination and estimate WTP for Halal certified meat sold at supermarkets and Halal stores | CVM through payment ladder. 19 fresh meat attributes were presented, then respondents were asked to rank their importance. WTP was measured in two stages: first whether they were willing to pay a premium for Halal certified meat. If yes, they were asked their WTP in percentage to actual price they usually paid. | Belgium | (Verbeke et al., 2013) |
| 3. | Price (per pound), label | 3-4 | To estimate WTP for organic chicken breast | DCE with MNL and RPL. Two alternatives products and no-choice option per choice set. | USA | (Van Loo, et.al., 2011) |
| 4. | Food safety label, multi-attribute traceability, on farm traceability, and animal welfare | - | Meta-analysis of studies on WTP for meats traceability | Hypothetical methods (CVM, conjoint analysis, choice modelling, hedonic pricing); Non-hypothetical methods (experimental auctions) | European countries, US, Canada | (Cicia & Colantuoni, 2010) |
| 5. | Animal health, food safety certification, nutritional label, price | 2-3 | To investigate consumer preferences and WTP for food safety assurance labels in beef | DCE with RPL | Ghana | (Owusu-Sekyere et al., 2014) |

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| No. | Attributes | Number of attributes level | Research Objectives | Methodology | Country | References |
|-----|-----------|----------------------------|---------------------|-------------|---------|-----------|
| 6. | Country of origin, feeding method, price | 2-4 | To value the food safety of beef after BSE outbreak in Japan | DCE | Japan | (Aizaki, 2004c in Aizaki, 2012) |
| 7. | Traceability information, quality certification, appearance, price | 4 | To elicit consumer preferences and WTP for traceability in pork | DCE with Mixed logit model and latent class model. Two alternatives products and no-choice option per choice set. | China | (Wang, et.al.,2014) |
| 8. | Price, type of commercial lamb, origin of production | 2-3 | To investigate consumers' preferences for lamb meat attributes | DCE with RPL Two alternatives products and no-choice option per choice set. | Spain | (Gracia & De-Magistris, 2013) |
| 9. | Region of origin, animal breed, traceability, animal feed, beef quality, cost of cut, farm ownership, growth promoters, guaranteed tender | 2-6 | To examine the relative utility of a set of beef steak | DCE and Adaptive Conjoint analysis; Hierarchical Bayesian method. In Adaptive conjoint analysis, alternative products were composed based on the respondent's rating for the attributes | USA | (Mennecke, at.al.,2007) |
| 10. | Quality and safety labelling, price, product brands | 2-6 | To investigate WTP for quality and safety label in branded beef | DCE with MNL 321 respondents | Germany | (Enneking, 2004) |

After an inventory of existing attributes was made, the next step was to select the relevant and important attributes for this study. Priority should be considered for attributes which are demand-relevant, policy-relevant, and measureable (Blamey et.al., 2002 in Kjær, 2005). The number of attributes selected was restricted to five attributes to avoid the survey would become tedious and tiring for the respondents.

From the existing attributes found in table 3.1, attribute price, traceability information, and slaughter methods were considered the most relevant and important for this study. Inclusion of price as an attribute enabled to indirectly obtain respondent's WTP of the good as a whole (an alternative) and WTP for certain level of attribute or marginal WTP (part worth or implicit price) (Bennet & Blamey, 2001 in Kjær, 2005).

Traceability information was regarded as an important product attribute because it could give information on how beef meat was handled and processed. It is also part of food safety risk management tool obliged by the EU and can be used to reassure consumer confidence on food safety. It can be fully disclosed on the label, such as by giving information where the animals were born, reared, slaughtered, and processed; or by putting a QR code on the label containing similar information.

Slaughter method was selected particularly due to divided opinions with respect to pre-slaughtering stunning. Some consumers opt to choose beef slaughtered without stunning, some others do not mind about the stunning process, while the rest is not aware of this debate or remains indifferent. Slaughter method might be incorporated into traceability information. However, to be able to distinguish the demand for meat obtained from stunned or not-stunned animals, slaughter method is added as a separate attribute.

Apart from the attributes derived from previous studies, two other attributes were selected, i.e. Halal certification and place of purchase. These attributes were considered demand-relevant in decision making to buy Halal meat. Halal certification was selected as an attribute due to its urgency amidst the demand for Halal assurance in the food chain and in line with the main purpose of this study. Place of purchase was considered as a crucial attribute for a Halal consumer in making decision to buy Halal meat. A study in the UK and Belgium showed that there was a high tendency that Muslim consumers prefer to buy Halal meat in local Halal shops rather than in supermarkets because they have personal trust to the sellers, although supermarket products are considered more hygienic and serve better quality (Ahmed, 2008; Bonne & Verbeke, 2007).

### 3.1.2.    Identification of levels

In the process of determining levels of an attribute, it is important that the levels must be plausible, actionable to the respondents, and constructed in a way that the respondents are willing to make trade-offs between combination of the attributes (Ryan, 1991 in Kjær, 2005). It is also important to limit the number of attributes and levels to a minimum, while still being able to elaborate overall utilities of the consumers. The more attributes and levels, the higher the error variance, and the more respondents needed to obtain significant results.

Curry (1997) suggested that every attribute should have the same number of levels to minimize bias on the result (Kjær, 2005). However, it was not possible to apply the same number of levels in each attribute for this study. Table 3. 2 shows the levels selected for each attribute in this study.

Table 3. 2. Identification of Level for each attribute

| Attributes | Levels |
|---|---|
| Slaughter method | With stunning; No stunning |
| Traceability information | Yes; No |
| Place of purchase | Halal stores; regular supermarket |
| Halal certificate | Small certifiers; Official certifiers; International Certifiers |
| Price per 500 gram | 2.75€; 3.25€; and 3.75€. |

Slaughter method had two levels i.e. stunning and no stunning. Traceability information also has two levels i.e. with and without traceability information. There are at least two mainstream place of purchases in which consumers can buy Halal beef in the Netherlands, i.e. local Halal shops and supermarket (see section 2.2.1). Levels of Halal certification were adopted from van Dalen and van Waarden (2010), i.e.:

a. Small certifiers

This category consists of small and often individual certifiers, such as local imams or self-certifiers. Local imams certify the products on the ground of personal trust to the producers or sellers. This type of Halal certification's trustworthiness depends on the imam's or personal's competence. While self-certifier is for example a food business operator who claim that it produces or sells Halal products.

b. Official certifiers

Official certification bodies have formal organizational structure and set their own Halal standards. Some may adopt and be audited by international certification bodies. They usually have website page for public to access with respect to their practices. Examples are Halal Correct, Halal Quality Control, Halal Food and Feed (HVV), Halal International Control (HIC).

c. International certifiers

Mostly are Islamic Authority from Muslim-majority countries such as JAKIM (Malaysia), MUI (Indonesia), IHI Alliance (Malaysia).

In setting the price levels, ground beef was selected as a reference because this product is available both in Halal stores and supermarkets. A proper price level (both in numbers and range) can prevent an over- or underestimated WTP. Three levels of beef prices were selected based on the current prices found in the Netherlands. A baseline price of 2.75 € or the lowest level was obtained from the average price of Halal beef sold in Halal stores across the Netherlands based on author's own investigations. The maximum price (3.75 €) corresponds to the highest price found for normal ground beef, excluding organic beef and lean beef. One middle level (3.25 €) was added between the minimum and maximum price.

### 3.1.3. Experimental design

The objective of an experimental design is to keep the number of alternatives minimal, but still being able to figure out the utilities of all possible alternatives (Kjær, 2005). The number of possible alternatives expands exponentially along with the number of attributes and levels (# alternatives =

#levels[#attributes] ). Inclusion of all possible alternatives is termed as full factorial design, or $2^3 3^2 = 72$ alternatives for this study. However, asking respondents with all possible alternatives can be less plausible. Generally, survey participants will be tired when questioned for more than 20 or 30 minutes (Allenby & Rossi, 1998).

At present, there are computer programmes which can do the task of constructing efficient design, for example SAS and Sawtooth Software. These programs can generate an experimental design according to the researcher's limitations such as the number of attributes and levels, the number of product alternatives per choice set, and the number of choice tasks. Design efficiency (termed as D-efficiency) should be taken into account when selecting the alternatives. It aims to reduce the variance and covariance of the parameter estimates (part-worth utility), and can be achieved by satisfying four principles i.e. minimal overlap, level balance, orthogonality, and utility balance; although optimizing all principles seems rather impossible (Kjær, 2005).

The principle of minimal overlap is satisfied when a level of an attributes is not repeated in a choice set or by showing each attribute level as few times as possible in one choice set. If an attribute's number of level is equal to the number of alternatives in one choice set, each level will occur exactly once in the choice set. Level balance is achieved when the levels of an attribute occur in approximately equal frequency in the whole choice sets. While orthogonality is satisfied by choosing attribute levels independently from other levels, and allowing each attribute level utility to be measured independently of all other effects ( Kjær, 2005; Sawtooth Software, 2017).

In this study, choice sets were generated by Discover-Choice Based Conjoint Analysis (Discover-CBC)[4], an online survey tool developed by Sawtooth Software. The experimental design composed by Discover-CBC conforms to at least three principles; minimal overlap, level balance, and orthogonality (Sawtooth Software, 2017).

Prohibition was employed to avoid the occurrence of certain combinations of level and attributes which might be impossible to happen in real life. The following combinations of level and attributes did not appear in an alternative altogether.

1. Beef available in the supermarkets is only from stunned animals (due to market condition, see chapter 2.2.3).
2. Beef with traceability information should cost more than 2.75 euro (lowest price).
3. Beef certified with international Halal certifiers should cost more than 2.75 euro (lowest price).
4. Beef certified with small Halal certifier should cost less than 3.75 euro (highest price).

The number of choice tasks used was 18 as recommended by the software considering time elapsed to complete the tasks and error variance from attribute and levels. Each choice task consisted of two alternatives and an opt out (or *None*) option. In this study an opt-out alternative was included to allow respondent to choose neither of the alternatives.

There are multiple debates regarding this *none* option. The proponent argued that inclusion opt-out alternative will not only enable to model the probability of choosing something but also the probability of choosing nothing (Adamowicz et.al, 1998 in Kjær, 2005). Therefore it enables the researcher to observe and model a non-choice decision as it is part of real market behaviour in which consumer can cancel the purchase or purchase the product elsewhere. Meanwhile, the disadvantage of providing an

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[4] Discrete choice experiment is also widely known as choice-based conjoint analysis. Sawtooth software uses the term Choice-Based conjoint (CBC) experiment, particularly to name its software Discover-CBC. To avoid confusion, this report will use the term "discrete choice experiment", except for referring the software Discover-CBC.

opt-out alternative is that the respondents tend to choose an opt-out option not because it serves the highest utility but simply because the tasks are too cognitive demanding or they cannot decide if the alternatives seems difficult to distinguish. (Kjær, 2005). Table 3. 3 shows an example of one choice task.

Table 3. 3. Example of a choice task

|  | **Product A** | **Product B** |  |
|---|---|---|---|
| Slaughter method | No stunning | With stunning | **NONE** : I wouldn't choose any of these |
| Traceability | Yes | No |  |
| Place of purchase | Halal store | Supermarket |  |
| Halal certificate | Small | Official |  |
| Price per 500 gram | 3.75 euro | 3.25 euro |  |
| **I choose** | ○ | ○ | ○ |

### 3.1.4. Questionnaire construction

At the beginning of the survey, a brief introduction was presented to give an overview about the purpose of the survey. Two preliminary questions were asked to ensure only eligible respondents participate in the survey. Eligible respondents are Muslim, consuming Halal beef, and being responsible for their own grocery shopping either on regular basis or occasionally. Reward was offered as an incentive to participate in the survey.

The questionnaire was divided into two parts. In the first part, a few questions were asked to elicit sociodemographic information and buying behaviour of the respondents towards Halal beef. The questions included gender, age, Dutch citizenship, household members, educational background, ethnic background, and monthly income. In addition, several questions regarding their behaviour in consuming beef were enquired, including the frequency and amount of purchase. Information on sociodemographic and buying behaviour allows to divide the samples into subgroups and analyse whether different subgroups respond differently.

In the second part, the choice tasks were presented. An introductory text and attributes explanation were available to guide the respondents in answering the questions. After that, a self-assessment was provided for the respondents to appraise their knowledge on the attributes of Halal beef according to their own knowledge and/ or explanation provided.

A cheap talk was included before the choice tasks as a way to minimize hypothetical bias (Cummings & Taylor, 1999) which is considered as a common problem in a hypothetical experiment like DCE, in which hypothetical and real values of WTP may differ significantly (Van Loo et al., 2011). A cheap talk script informs the respondents about hypothetical bias and a reminder to answer the questions as if they are in a real situation of buying the meat with an emphasis that budget constraints should become one of their considerations and the particular product assessed in the questionnaire is part of substitutes and complementary products (Bennett and Blamey, 2001 in Kjær, 2005).

The questionnaire was pre-tested to 11 students at Wageningen University and Research to assess the clarity of the tasks, participants' understanding towards the survey, and elapsed time to complete the survey. The participants completed the questionnaire within 10 – 15 minutes on average. Improvement was made based on the evaluation of test results, particularly in wording and length of text. According to pre-test results and its improvements, the questionnaire was considered workable for implementation (see Appendix B).

## 3.2. Data collection

The survey was put online, conducted in English and Dutch, and accessible via computer or mobile phone. The intended respondents were Muslims living in the Netherlands, either Dutch citizens or from other countries.

The method of sampling uses random sampling and snowball sampling method. In simple random sampling, every member of the population has an equal opportunity to be a respondent, while snowball sampling uses referral from an initial respondent to solicit potential respondents.

Respondents were approached in several ways; personal contacts, referral of existing respondents (snowball sampling), direct approach in certain places such as university and mosques, sending the links to members of Halal information websites in the Netherlands (*www.ikeethalal.nl*) and by sending emails to mosques clerics across the Netherlands.

During the direct approaches to potential respondents, there was a non-response bias particularly from elder people who did not speak English. The approaches were then focused only to younger generation who speak English, mainly students. The data collection was conducted from 18 - 29 November 2017. In total there were 242 respondents who completed the survey.

## 3.3. Data analysis

Discover-CBC employs Multinomial Logit Model combined with Empirical Bayes to calculate utility estimation (Sawtooth Software, 2014). Empirical Bayes method estimates the maximum likelihood for each individual while shrinking the data towards population estimates. First, the likelihood of the population to choose each alternative in the choice set is computed using MNL. Then, this data is used to augment the individual's choice probability. Next, the augmented individual data is used to estimate parameters (or part-worth utility/ β) using maximum likelihood estimation with Newton-Raphson algorithm.

The utility of halal beef of a person consist of the sum of part-worth utility for each observed attribute and utilities of random/ unobserved attributes. The observed attributes in this study were slaughter method, traceability info, place of purchase, halal certifier, and price. Utility for Halal beef for individual $i$ to choose alternative $j$ under MNL is formulated as follows:

$$U_{ij} = \beta_2 Slaughter\_method_{ij} + \beta_3 Traceability\_info_{ij} + \beta_4 Place\_ofPurchase_{ij} \qquad (6)$$
$$+ \beta_5 Halal\_certifier_{ij} + \beta_6 Price_{ij} + \varepsilon_{ij}$$

The output data from Discover-CBC are individual utility scores (part-worth utility) and importance scores. Part-worth utility score allows to compare relative utility of each level within an attribute, but not to other attributes. Attribute level with higher score is more desirable than those of lower score within an attribute. Part-worth utilities were rescaled to zero (termed as *zero-centered diffs)* in which the total utilities within an attribute sum to zero. This method is employed to normalize the utility scale for each respondent to make it comparable across the respondents (Sawtooth Software, 2014).

Importance score of attributes shows the relative score of certain attribute compared to other attributes. For each attribute, important score is derived by calculating the difference between the highest and the lowest part-worth utility score, divided by the total utilities of all observed attribute. Importance score for attribute $a$ relative to $e$ number of observed attributes is calculated as follows:

$$Importance_a = \frac{(\beta_{a\,max} - \beta_{a\,min})}{\sum_{n=a}^{e}(\beta'_{max} - \beta'_{min})} \qquad (7)$$

For example, the importance of Halal certifier of an individual is formulated as follows:

$$Importance_{HC}$$

$$= \frac{(\beta_{HC\_max} - \beta_{HC\_min})}{((\beta_{SM\_max} - \beta_{SM_{min}}) + (\beta_{TI\_max} - \beta_{TI_{min}}) + (\beta_{PP\_max} - \beta_{PP_{min}}) + (\beta_{HC\_max} - \beta_{HC_{min}}) + (\beta_{P\_max} - \beta_{P_{min}}))}$$

Since the choice tasks also include *none* option, its utility was also estimated. None utility was calculated for each choice task in which respondents choose none option. Lower score means that respondents choose none utility less often than product alternatives in the choice task. It is interpreted that respondents could differentiate or make trade-offs between product alternatives in the choice tasks.

The part-worth utility and importance scores were further analysed using IBM SPSS Statistics 23. First, descriptive analysis of the population was performed. In addition, a correlation test between sociodemographic variables were carried out using Spearman rank's test and Pearson correlation test. One-Way ANOVA test was carried out to test whether each sub-group of a sociodemographic variable responds differently with respect to attributes importance and utility scores.

WTP can be estimated as the marginal rate of substitution of a particular attribute or level for price levels (Louviere & Islam, 2008). For a utility function as in formula 6 above, WTP for official Halal certifier is calculated as:

$$WTP_{official\_certifier} = \beta_{official\_certifier} / \beta_{price} \tag{8}$$

with $\beta_{price}$ being the utility per monetary value (€) or ratio being in units of utility per euro, calculated as the difference of the ratio per euro to the difference of part-worth utilities across the price ranges.

# 4. Result

In this chapter, results of this study are elaborated. All completed survey responses were used for the analysis. The data analysis was performed using IBM SPSS Statistics 23 and consisted of four steps; descriptive analysis of the population, relative importance of the attributes and relative utilities of Halal beef (RQ 1 & 2), WTP estimation for Halal certification (RQ 3).

## 4.1. Sociodemographic of the population

In general, Halal consumers in the Netherlands are not exclusively Dutch citizens. Therefore, this study also included Muslim residents from other countries who are currently living in the Netherlands, for example students, and expatriates. In total 242 respondents completed the survey. Around 53% of the respondents were Dutch, while the remaining 47% were non-Dutch. The majority of non-Dutch respondents were temporary residents (63%), followed by 29% permanent residents, and the rest were asylum seeker (8%). Temporary residents are foreigners staying for a certain period of time, for example to study or work, and intend to leave after completing the study or work. Permanent residents are foreigners who are staying in the Netherlands for a longer period of time while still retaining his/ her citizenship. Meanwhile, asylum seekers are those who fled their own countries and enter the Netherlands to stay.

According to the categorization of Halal consumers by Van Waarden and van Dalen (2010) (see section 2.3.2), there are at least two types of Halal consumers involved in this study*; natural* and *conscious* consumers. Meanwhile, *Western* and *ignorant* consumers were excluded from this study. The temporary residents such as the students and expatriates coming from Muslim-majority countries, who once were *natural* consumers in their home country shifted to *conscious* consumers. However, there is not yet any studies found regarding the behaviour of such consumers.

The respondents had diverse ethnic origins. The largest group of Dutch respondents was of Moroccan background (46,1%) followed by Native Dutch (16,4%), Turkish (14,1%), and mixed races (4,6%), while the remaining (18,8%) were from other ethnic backgrounds. In total, there were 17 different ethnic backgrounds of Dutch respondents. This sample more or less reflect the statistics from 2007 in which Turkish and Moroccan origin together made up 69% of the Dutch Muslim population (van Herten, 2007) and majority of them still observe Halal food for their daily consumptions (Maliepaard & Gijsberts, 2012).

The largest group of non-Dutch respondents was of Indonesian origin (61,4%), followed by Turkish (11,4%), and Moroccan (5,3%), while the remaining (21,9%) were from various ethnic backgrounds. In total there were 19 different nationalities or ethnic backgrounds of non-Dutch respondents. The large number of Indonesian participating in this study was due to the use of personal contacts to solicit the respondents.

The respondents were scattered throughout the twelve provinces in the Netherlands, with the majority from Gelderland (28%) and Zuid Holland (27%) as shown in Figure 4. 1 below. A large number of respondents living in Gelderland (including Wageningen, Ede, Arnhem) was a result of approaching international students in Wageningen University & Research (WUR) and local residents. The next biggest groups were from Zuid-Holland (27%), Utrecht (12%), and Noord-Holland (11%), as a result of visits to Rotterdam, Utrecht, and Amsterdam to solicit potential respondents. Those cities were chosen due to their significant number of Muslim populations. The respondents were then invited to share the survey links to their relatives and friends.
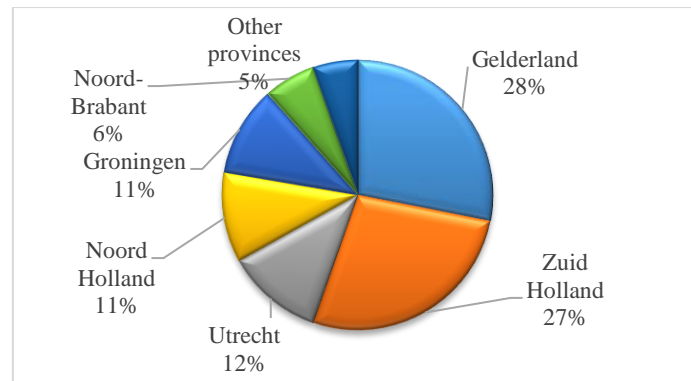
Figure 4. 1. Distribution of respondents based on places of residence

Approximately 69% of the respondents were female and the remaining 31% were male. The vast majority (95%) of the respondents were within the age of 18-45 years old, with half of them being females within the age of 18 – 35. Lowest education completed for the whole population was Secondary school, only one female respondent did not finish school. Nearly half of the respondents finished bachelor degree, while the rest finished secondary school and master degree or higher in almost equal percentage. See table C.1. in appendix C for an overview of the distribution of gender, age, and education level.

In general, the majority of the respondents were student (43%) followed by employee (30%), and housewife (12%). Putting the survey link in Halal information website *(www.ikeethalal.nl)* and visiting mosques have helped to reach respondents from various occupations. In the Dutch sub-group, the largest group of occupation was employee (40%) followed by student (33%). Meanwhile, in the non-Dutch respondent group, with around half of the population were students followed by employee (25%), and housewife (15%). Large group of students was a result from the approach to use personal contacts who were mostly student at WUR. See table C.2 in appendix C for the overview of the distribution of citizenship, age, and occupation.

During the survey, respondents were asked to enter the number of household members. It was recorded that the household members were between 1 to 5 people. Nearly half of the respondents were household of four and five (around 25% for each category), followed by single household and household of three around 18% each, and the remaining was household of two. Single household made up the majority of non-Dutch group for around 32%, while households of four and five contributed to the majority of Dutch respondents for 64% in total.

Nearly a quarter of the respondents earned a monthly net disposable income of more than € 2,500, while the remaining was equally distributed in income group of less than € 1,500 and between € 1,500 - € 2,500 (38% each). Around 82% of single household were non-Dutch, and 75% of single household earned less than € 1,500. See table C.3 in appendix C for the overview of the distribution of citizenship, household member, and income.

Table 4. 1 shows the correlation tests results across socio-demographic variables. Citizenship had strong correlation with education (0,308) due to high number of foreign master/ PhD students taking part in the survey. Meanwhile, non-Dutch respondents tend to have smaller number of household members than Dutch respondents (-0.309). Income level (0.281) and occupation (0.300) had strong correlation with average amount of consumption with students and those who earned less tend to buy smaller amount of beef.

Table 4. 1 Correlation test across socio-demographic variables using Spearman's rank and Pearson correlation

| Socio-demographic variable | Citizenship | Gender | Age | Education | Occupation | HH number | HH income | Frequency | Average amount |
|---|---|---|---|---|---|---|---|---|---|
| Citizenship | - | | | | | | | | |
| Gender | 0.155* | - | | | | | | | |
| Age | 0.163* | 0.132* | - | | | | | | |
| Education | 0.308** | 0.169** | 0.142* | - | | | | | |
| Occupation | -0.165* | -0.19** | 0.52** | 0.11 | - | | | | |
| HH number | -0.309** | -0.115 | 0.154* | -0.158* | 0.236** | - | | | |
| HH income | -0.082 | 0.1 | 0.271** | 0.14* | 0.281** | 0.267** | - | | |
| Frequency | 0.082 | 0.031 | 0.155* | 0.096 | -0.008 | 0.033 | 0.033 | - | |
| Average Amount | -0.066 | 0.078 | 0.197** | -0.057 | 0.300** | 0.249** | 0.182** | -0.149* | - |

\* correlation is significant at the 0.05 level (2-tailed) ; ** correlation is significant at the 0.01 level (2-tailed)

## Buying behaviour

Table 4. 2 shows the distribution of the frequency and amount of beef purchase which is used to reflect buying behaviour of the consumers. Regardless of their income group, 38% of the respondents buy beef meat 2 – 3 times per month, 31% and 28% buy once a month and once a week respectively, while only 7% buys beef more than once per week.

Around 38% of the respondents buy on average 500 gr to 1 kg of beef per purchase. Some respondents gave remarks that once in a while they also buy meat in a bulk and store it for the next few months. Buying frequency and amount of purchase has a weak negative correlation (-0.149). It shows that the more frequent a consumer buys meat, the less the amount per purchase. Meanwhile, household number has a positive correlation to amount per purchase (0.249) meaning that the bigger the household number, the higher the amount per purchase. Respondents from higher income group buy larger amount of beef in average (0.182).

Table 4. 2. Distribution frequency and amount of beef purchase

| Variable | Percentage |
|---|---|
| *Frequency of beef purchasing* | *100%* |
| - Once a month | 31% |
| - 2-3 times per month | 38% |
| - Once a week | 24% |
| - More than once a week | 7% |
| *Average amount of beef purchasing* | *100%* |
| 250 gr - 500 gr | 18% |
| 500 gr - 1 kg | 38% |
| 1 kg - 2 kg | 23% |
| > 2 kg | 21% |

In order to investigate consumers' knowledge on Halal beef attributes, respondents were asked to assess their own knowledge towards attributes of Halal beef by giving scores from poor to excellent as shown

in Figure 4. 2 below. The attribute perceived as least known was traceability information with 62% of the respondents assessed themselves having poor to fair knowledge. Meanwhile, on average 71% of the respondent considered themselves having good to excellent knowledge for the other four attributes.
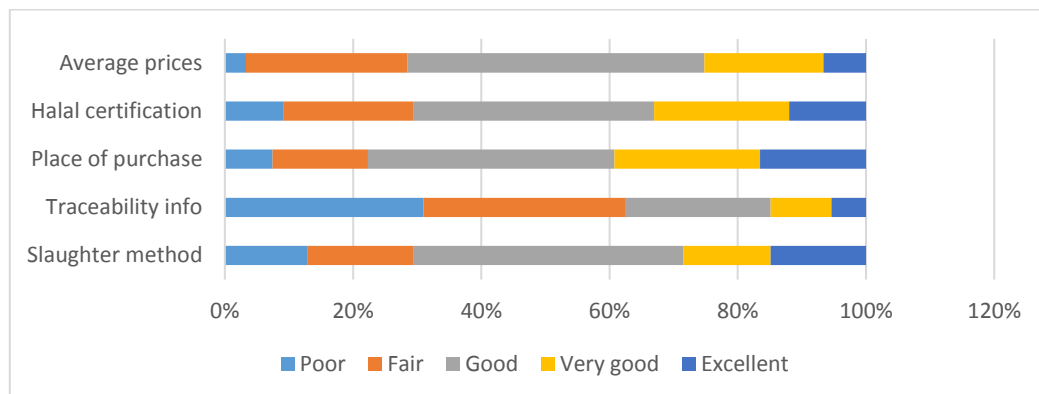


Figure 4. 2. Self-assessment of attributes knowledge

## 4.2. Relative importance of Halal beef attributes

Relative importance of an attribute shows how important an attribute is compared to other attributes observed in the study. Figure 4. 3 shows the relative importance of Halal beef attributes in this study (see Table D. 1 in appendix D for complete data). Slaughter method had the highest score (0,39) among other attributes which means that this attribute was valued as the most important relative to the others, followed by Halal certificate (0,182) and place of purchase (0,181), price (0,13), and traceability information (0,11). Halal certification was valued slightly more important than place of purchase.
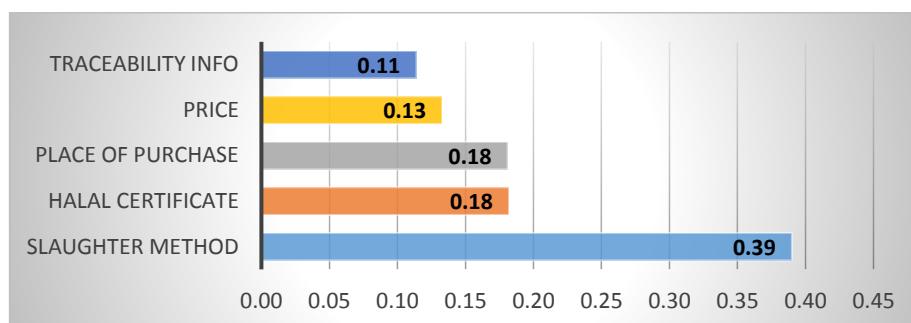


Figure 4. 3. Relative importance of Halal beef attributes

The order of attribute importance varied across socio-demographic variables as shown in Table 4. 3. In all subgroups of citizenship, gender, and education level, slaughter method was perceived as the most important attribute. Meanwhile, Halal certification and place of purchase were valued either second or third most important, except for the Non-Dutch subgroup who regarded price attribute as the second most important attribute. Price and traceability information were valued interchangeably as the least important attribute.

Table 4. 3 Order of attributes importance across socio-demographic variables

| Rank | General | Citizenship | | Gender | | Education level | | |
|------|---------|------|----------|--------|------|-----------|----------|--------|
| | | Dutch | Non-Dutch | Female | Male | Secondary | Bachelor | Master |
| 1 | SM | SM | SM | SM | SM | SM | SM | SM |
| 2 | HC | PP | P | PP | HC | PP | HC | PP |
| 3 | PP | HC | HC | HC | PP | HC | PP | HC |
| 4 | P | TI | PP | TI | P | P | TI | P |
| 5 | TI | P | TI | P | TI | TI | P | TI |

*Note:* SM is slaughter method; HC is Halal certification; PP is place of purchase, P is price, TI is traceability information

One-way ANOVA was used to test whether the importance score of each attribute per subgroup of sociodemographic variable was statistically different, see Table 4. 4. Age and income level did not affect how respondents perceived the importance scores for all attributes. Place of purchase was the only attribute not perceived differently by each socio-demographic variables. Gender and education levels affected the importance of traceability information. Meanwhile, the importance of Halal certificate was only influenced by citizenship.

Citizenship, gender, and education were the sociodemographic variables which affected the perception on the attribute importance. Therefore, a further elaboration is presented for these variables.

Table 4. 4 Importance scores of different socio-demographic category

| Attribute | Citizenship | Gender | Age | Income | Education | Household number |
|-----------|-------------|--------|-----|--------|-----------|------------------|
| Slaughter method | ✓ | - | - | - | ✓ | - |
| Traceability info | - | ✓ | - | - | ✓ | - |
| Halal certificate | ✓ | - | - | - | - | - |
| Place of purchase | - | - | - | - | - | - |
| Price | ✓ | ✓ | - | - | ✓ | ✓ |

*Note:* ✓ means there is a statistically significant within the group (at level 0.05) using One Way ANOVA test

### 4.2.1. Relative importance based on citizenship

Figure 4. 4 shows that for both the Dutch and non-Dutch group, slaughter method was valued as the most important attribute, although Dutch consumers gave a higher importance than non-Dutch consumers. Meanwhile, price was perceived as the least important attribute for Dutch consumer, but ranked as second most important for non-Dutch consumers together with Halal certificate. This can be a result of different purchasing power between the Dutch and non-Dutch population. This assumption is corroborated by the correlation test between citizenship and household income which showed that respondents from non-Dutch group earned less than Dutch respondents (see Table 4. 1 in section 4.1).
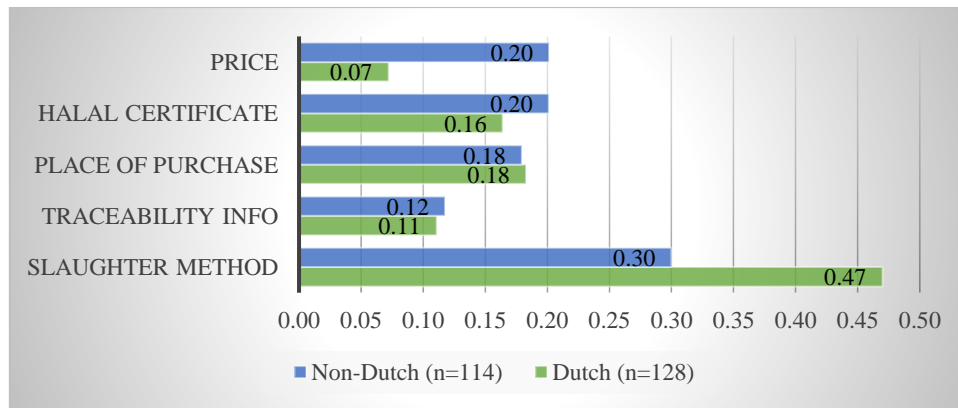
*Note: slaughter method, Halal certificate, and price are statistically significant at 0,05 level*

Figure 4. 4. Relative importance based on citizenship

Both groups ranked Halal certificate as the third most important attribute, although non-Dutch consumers valued Halal certificate with a higher importance than Dutch consumers. This finding could be driven by the fact that most non-Dutch respondents come from Muslim-majority countries where they might perceive that Halal certification could be an important tool for Halal status assurance of a product in a Muslim-minority country. Meanwhile, for Dutch consumers place of purchase was more important than Halal certificate, and vice versa for non-Dutch consumers. This finding could be driven by personal trust and attachment to the sellers and thus to find reliable and trustworthy sellers are more important than Halal certificate. Traceability information is perceived as the least important attribute for non-Dutch and second least important for Dutch respondents.

### 4.2.2. Relative importance based on gender

Table 4. 5 shows that both male and female respondents valued slaughter method with the highest importance compared to other attributes. For male respondents, Halal certificate was more important than place of purchase, and vice versa for female respondents although the values were only slightly different. In addition, female consumers valued traceability information with higher importance than male respondents. This finding complies to previous findings by Stran & Knol (2013) showing that female consumers checked and used food labels more often than their male counterparts, particularly middle-aged female consumers with a high education level (Wandel, 1997).

Male respondents considered price attribute of a higher importance than their female counterparts. This finding was different than those from a previous study in the US by Hui et.al., (1995) in which women were relatively more concerned about meat price. This finding could be justified as an effect of income level in which 60% of male respondents were non-Dutch, and 43% of them were students who earned less than other groups.
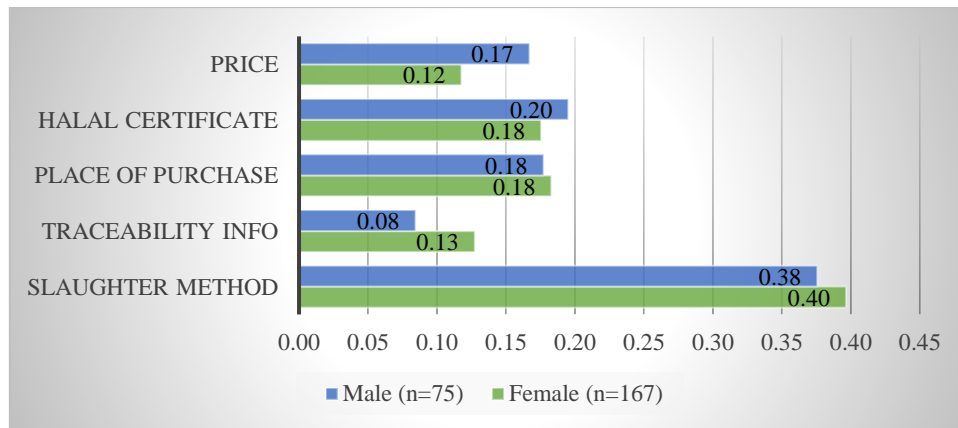
Figure 4. 5. Relative importance based on gender

### 4.2.3. Relative importance based on education level

Figure 4. 6 shows that both groups who completed secondary school and master degree had similar order of importance of the five attributes, which were slaughter method, place of purchase, Halal certificate, price, and traceability information. Each sub-group valued slaughter method with the highest importance, with consumers who completed secondary school giving the highest score than the others. Around 73% of secondary school graduates were Dutch citizen. It is somehow surprising that respondents with the highest education level valued traceability information as the least important and lowest score (0.09).
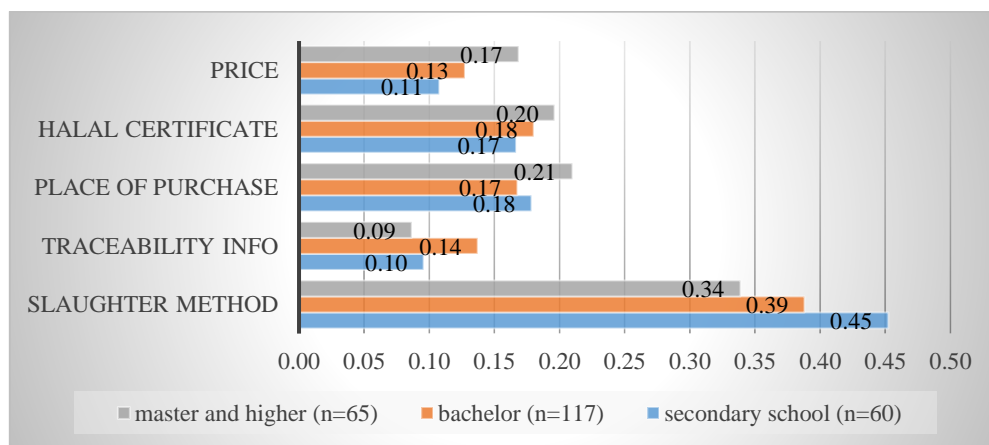
Figure 4. 6. Relative importance based on education level

## 4.3. Relative utilities of Halal beef

Relative utility is derived from the attributes and their levels (part-worth utilities). Part-worth utilities of Halal beef attributes were examined to understand which level of each attribute is the most desirable. Results are shown below in Figure 4. 7 (see Table D. 2 in Appendix D for complete data). A negative score shows a less desired level, while a positive score shows a more desired level.
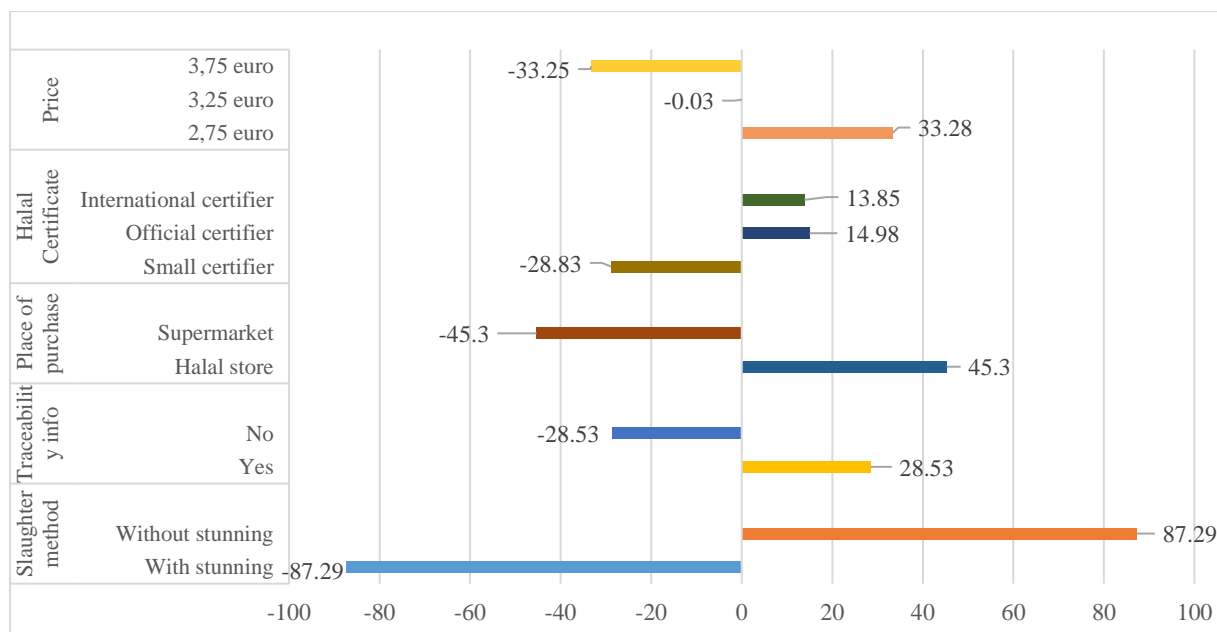
Figure 4. 7. Part-worth utilities for Halal beef in the Netherlands

For the slaughter method attribute, meat obtained from non-stunned animal was much more preferred than from stunned animals. For traceability info, consumers preferred products with traceability info rather than without one. Halal store was also more desirable than supermarket. Halal certificate from official certifier was the most preferred one, but only slightly preferred than an international certifier. For price attribute, the cheapest level (2.75 euro) was mostly preferred, while the highest level was least preferred.

The combination of attributes with the desired level makes up a product serving the highest utilities for the consumers or the ideal product. In this study, the highest utilities of Halal ground beef was comprised of meat obtained without pre-slaughtering stunning, with traceability info, available at Halal store, certified by an official certifier, and sold at 2.75 euro per 500 gram.

### 4.3.1. None Utility

None utility was compared to the total utilities of ideal product to know whether respondents would prefer to choose the ideal product or other products. Mean, standard deviation, and standard error of none utility were -29.17; 129.00; and 8.29 respectively. Data were quite heterogeneous across individuals, and none utility ranged from 99.83 and -158.17.

It can be seen from Table 4. 5 that utilities from the ideal product ranged from -0.11 to 418.87. This indicates that the utilities range of the ideal product varied considerably. Although, the ideal product was greatly valued, it might also be not preferred by certain respondents, as indicated by negative utility (-0.11). Respondents with none utility between -158 to 0.11 would tend to choose the ideal product because their none utilities were lower than the utilities of ideal products. Meanwhile, respondents with none utility higher than utilities of ideal products might prefer other products composed by different levels of attributes.

Table 4. 5. Consumer utilities of ideal product

| Attribute | Desired level | Mean | Standard deviation | Standard error |
|---|---|---|---|---|
| Slaughter method | without stunning | 87.29 | 70.11 | 4.51 |
| Traceability info | yes | 28.53 | 26.57 | 1.71 |
| Place of purchase | Halal shop | 45.3 | 36.63 | 2.35 |
| Halal certifier | official certifier | 14.98 | 38.45 | 2.47 |
| Price | 2.75 € | 33.28 | 37.73 | 2.4 |
| Consumer utilities | | 209.38 | 209.49 | 13.44 |
| Range | -0.11 (min) to 418.87 (max) | | | |

### 4.3.2. Relative utilities based on citizenship

It can be inferred from Figure 4. 8 that in general Dutch and non-Dutch respondents had similar preference for each attribute, except for Halal certifier. However, they differed in the relative magnitude of preference. For example, although meat from non-stunned animals was preferred by both groups, but it was much more desired by the Dutch group than by non-Dutch group.

Non-Dutch respondents preferred International Halal certifier, while Dutch respondents preferred an official one. Moreover, although a small certifier was least preferred by both groups, for non-Dutch respondents the magnitude of this least preference was higher than for Dutch respondents.
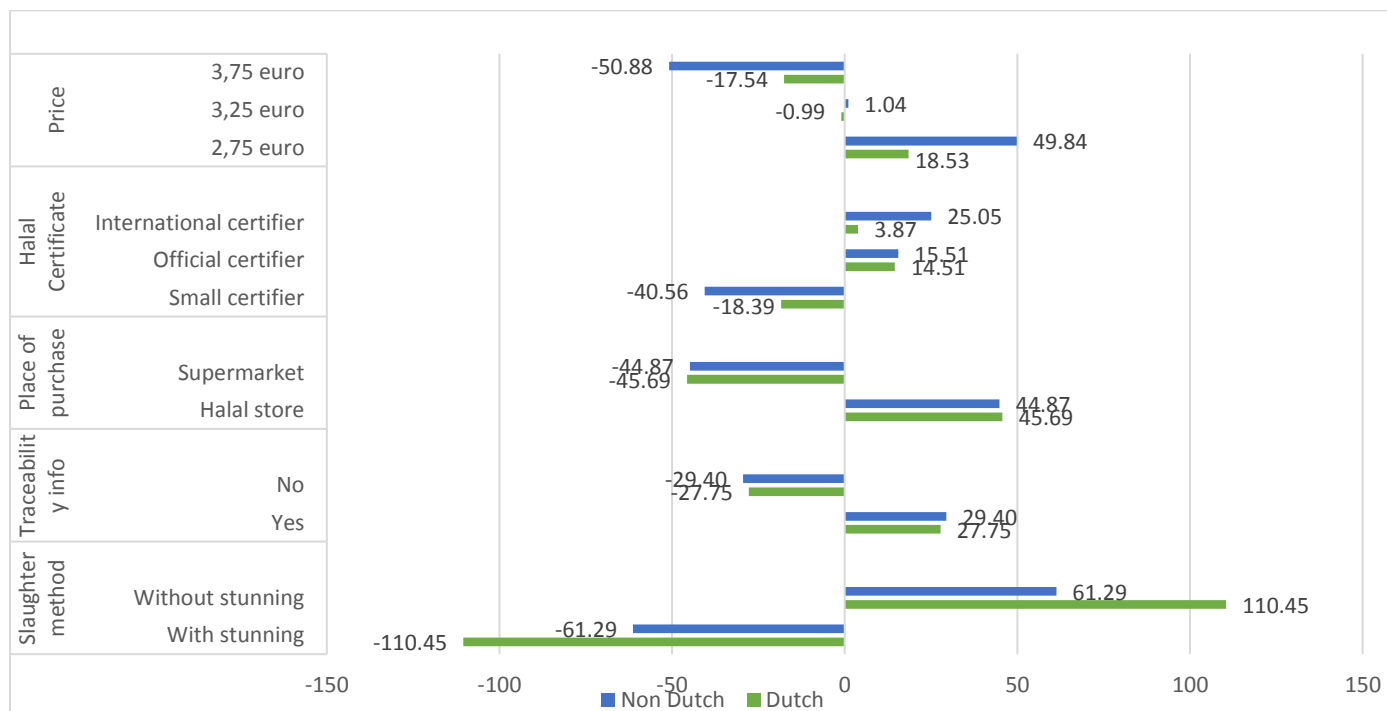


Figure 4. 8. Part-worth utilities based on citizenship

### 4.3.3. Relative utilities based on gender

From Figure 4. 9 below we can see that in general female and male respondents had similar preference for each attribute, except for Halal certifier. Male respondents (60% were non-Dutch) preferred international certifier, while female respondents (60% were Dutch) preferred official certifier. In addition, although price level 3.75 euro was least preferred by both group, for male respondents the magnitude of least preference was higher than female respondents'. This finding is consistent with

relative important score for attribute price in which male respondents were more price concern than female respondents (see section 4.2).
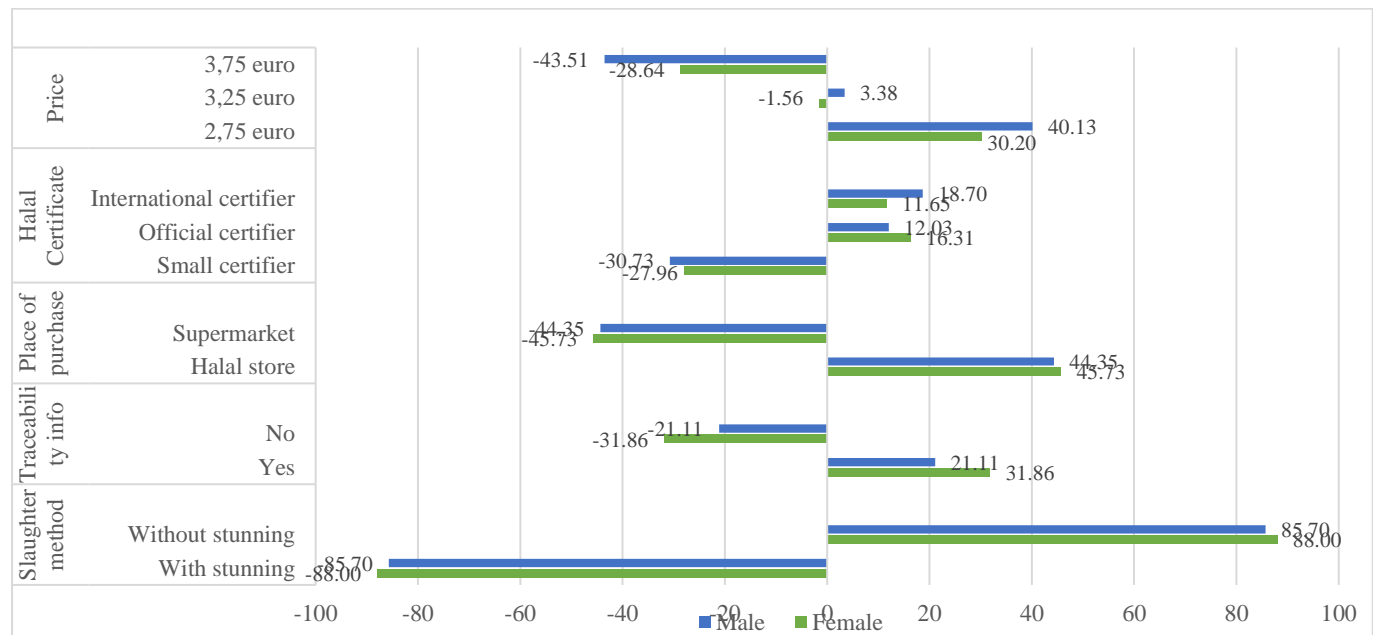


Figure 4. 9. Part-worth utilities based on gender

### 4.3.4.    Relative utilities based on education level

From Figure 4. 10 it can be seen that regardless their education level, the respondents had similar preference for each attribute, except for Halal certifier. The respondents who completed secondary and master degree preferred international certifier, while bachelor graduates preferred official one. In addition, although the three sub-groups preferred non-stunned animals and traceability information, bachelor graduates had the highest magnitude of preference among other sub-groups.
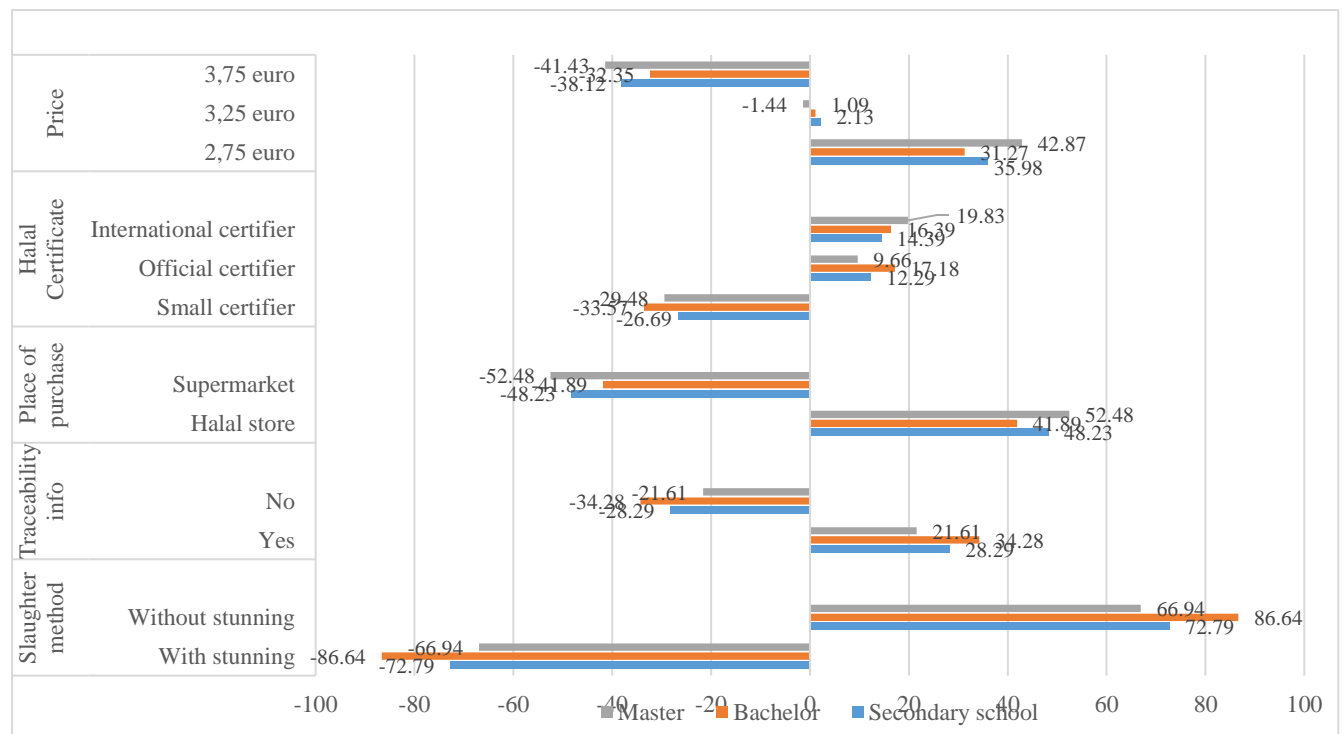


Figure 4. 10. Part-worth utilities based on education

## 4.4. Willingness to pay for Halal certification

Table 4. 6 shows that in general official certifier was mostly preferred, although only slightly preferred than an international certifier. Both official and international certifiers were preferred interchangeably across sociodemographic groups (see Table 4. 7Table 4. 4). Female, Dutch, and those who finished secondary and bachelor degree, and earned < € 1,500  monthly opted for the official certifier. Meanwhile, male, non-Dutch and those who finished master degree, and earned > € 1,500 monthly opted for international certifier.

Table 4. 6 Utility for each level of Halal certifier

| Certifier | Part-worth utility (mean) | Standard deviation | Standard error |
|---|---|---|---|
| Small certifier | -28.83 | 44.76 | 2.88 |
| Official certifier | 14.98 | 38.45 | 2.47 |
| International certifier | 13.85 | 40.40 | 2.60 |

Table 4. 7 Halal certifier part-worth utility across socio-demographic variable

| Socio-demographic variable | Small certifier | Official certifier | International certifier |
|---|---|---|---|
| **Gender** | | | |
| - Female | -27.96 | 16.31 | 11.65 |
| - Male | -30.73 | 12.03 | 18.70 |
| **Citizenship** | | | |
| - Dutch | -18.39 | 14.51 | 3.87 |
| - Non-Dutch | -40.56 | 15.51 | 25.05 |
| **Education** | | | |
| - Secondary school | -18.88 | 16.46 | 2.41 |
| - Bachelor degree | -33.57 | 17.18 | 16.39 |
| - Master degree | -29.48 | 9.66 | 19.83 |
| **Income group** | | | |
| - < € 1,500 | -26.69 | 12.29 | 14.39 |
| - € 1,500 - € 2,500 | -28.99 | 14.64 | 14.35 |
| - > € 2,500 | -31.97 | 19.79 | 12.18 |

It can be seen from Table 4. 8 that for any level of certifiers, consumers in general have a negative willingness to pay, with WTP for international certifier was the lowest one. This finding indicates that respondents tend to lose their utility towards a certain type of Halal certifier when confronted with price. When the lowest price would be available for products certified with either official or international certifier, consumers will tend to choose this product.

Table 4. 8 Estimation of WTP for Halal certifiers

| Type of Halal certifier | Number of samples | WTP (€/ 500 gr) | Standard deviation | Standard error |
|---|---|---|---|---|
| Small certifier | 34 | -0.73 | 1.15 | 0.20 |
| Official certifier | 114 | -0.93 | 1.29 | 0.12 |
| International certifier | 94 | -1.03 | 1.14 | 0.12 |

Table 4. 9 below shows that WTP for each Halal certifier differed across socio-demographic variables, although all resulted in negative WTP. Male consumers had lower WTP than female consumers. This finding is in accordance with section 4.2 and 4.3 showing that male consumers were more price sensitive than female consumers. Dutch consumers have a higher WTP compared to Non-Dutch consumers.

Table 4. 9 WTP estimation and standard deviation value across socio-demographic variable

| Type of Halal certifier | Number of respondent | WTP Small certifier (€/ 500 gr) | WTP Official certifier (€/ 500 gr) | WTP International certifier (€/ 500 gr) |
|---|---|---|---|---|
| **Gender** | | | | |
| - Female | 167 | -0.72 (1.19) | -0.85 (1.19) | -0.87 (0.96) |
| - Male | 75 | -0.74 (1.13) | -1.14 (1.53) | -1.31(1.39) |
| *Citizenship* | | | | |
| - Dutch | 128 | -0.29 (0.67) | -0.51 (0.60) | -0.85 (1.14) |
| - Non-Dutch | 114 | -1.64 (1.14) | -1.45 (1.67) | -1.17 (1.14) |
| *Education* | | | | |
| - Secondary school | 60 | -0.92 (1.52) | -0.68 (0.68) | -1.27 (1.39) |
| - Bachelor degree | 117 | -0.53 (0.71) | -0.86 (1.29) | -0.85 (0.96) |
| - Master degree | 65 | -0.74 (1.19) | -1.34 (1.69) | -1.17 (1.26) |
| *Income level* | | | | |
| - < € 1,500 | 92 | -0.57 (0.94) | -1.12 (1.56) | -1.24 (1.35) |
| - € 1,500 -€ 2,500 | 92 | -0.80 (1.11) | -0.93 (1.32) | -1.11 (1.15) |
| - >€ 2,500 | 58 | -0.95 (1.78) | -0.67 (0.65) | -0.57 (0.50) |

# 5. Discussion

The focus of this thesis was on consumers preferences for Halal beef in the Netherlands, particularly by estimating the importance weight for each attribute and its desired attribute level and analysing WTP for Halal certification.

## 5.1. Attributes importance and utilities of Halal beef

Slaughter method was valued as the most important attribute, regardless any sociodemographic variables. Majority of the respondents preferred meat obtained from animals without pre-slaughtering stunning compared to the stunned ones. However, currently there is no labelling which provides this information for the consumers. Consumers who want to assure this information have to find the information by themselves, for example by asking the butchers from which slaughterhouses the meats are supplied. They can further investigate by themselves to the slaughterhouse whether they apply pre-slaughtering stunning or not. However, this may not be practical for average consumers.

For Halal certified shops or products, consumers can check whether the certifiers permit pre-slaughtering or not. Some Dutch Halal certifiers, for example HVV and Halal Quality Control disclose their positions towards pre-slaughtering stunning. Aside from Halal shops and supermarket, currently some online Halal meat shops are available in the Netherlands, for example *Onsvlees* ([www.onsvlees.nl)](www.onsvlees.nl) and *Halalvleesexpress* ([www.Halalvleesexpress.nl)](www.Halalvleesexpress.nl). These shops provide information about their products and supply chain, including which slaughterhouses they work with, and whether they apply pre-slaughtering stunning. Information regarding slaughter method can also be incorporated in traceability labelling. This practice might be applicable only for meats sold in supermarkets where products are already packed and labelled.

Across socio-demographic variables, Halal certification ranked either 2nd or 3rd most important attribute out of five observed attributes, interchangeably with place of purchase. Meanwhile, traceability information ranked 4th or 5th. This finding could be contributed by the unfamiliarity of the consumers to traceability information with 62% of the respondents assessed themselves to have poor knowledge. Therefore, they might value traceability attribute with lower importance than other attributes they were familiar with.

For both Dutch and non-Dutch respondents, Halal certificate was valued as the 3rd most important attribute. While Dutch respondents valued place of purchase higher than Halal certificate, non-Dutch respondents valued price as more important than Halal certificate. Dutch respondents rely on Halal stores to buy meat rather than Halal certificate. Meanwhile, non-Dutch respondents rely on Halal certificates although they are more price sensitive than their Dutch counterparts. This finding is in accordance with past studies where consumers in the UK and Belgium prefer to shop at Halal stores rather than supermarkets due to personal trusts (Ahmed, 2008; Bonne & Verbeke, 2007). Van Waarden & van Dalen (2010) found that highly educated Dutch Muslims have more trust in Western institutions, including supermarket chains as a supplier of Halal food. However, this is not the case in this study in which these sub-group of population still preferred Halal stores than supermarket.

Respondents across socio-demographic variables desired the similar level of attributes, except for halal certifier. Male, non-Dutch, and those who finished secondary school or master graduates preferred international Halal certifier. Meanwhile, female, Dutch, and bachelor graduates preferred official certifier. Regardless any socio-demographic group, small certifier was least preferred. In spite of the rationale behind this consumers preference, this finding is in agreement with Alzeer, Rieder, & Hadeed, (2018), that nowadays halal certification can't be granted only by assessment of a religious scholar

(such as imams) but also require experts in food technology and pertaining fields due to the complexity of food supply chain and food processing.

While the findings provide interesting insights about consumer preferences for Halal beef, this study has some limitations including the high number of students participating in the survey, exclusion of other relevant attributes, and non-response bias from older generation Dutch Muslims (first generation immigrants) due to language barrier during the data collection. For future studies, it is suggested to involve a more balanced group of respondents to be able to draw a more representative result, especially from Dutch Muslims. According to the comments from the respondents, there were several additional attributes the respondents value important for Halal meat attributes such as animal welfare, organic production, and type of meats (lean and normal meat).

## 5.2. Negative willingness to pay for Halal certification

According to the result of this study, in general Halal certification ranks as the second most important attribute among other attributes observed in this study. This finding indicated that the consumers were aware of the importance of Halal certificate to assure whether a product is genuinely Halal. However, consumers were not willing to pay price premium for the desired certification. Consumers tend to lose their utility towards Halal certification when confronted with price.

Similar cases were found in previous studies in which an attribute was perceived as desirable by the consumers, but they were not willing to pay for the price premium, for example the study in traceability certificate for beef in Spain (Angulo, Gil, & Tamburo, 2005), and information on animal welfare/ handling for beef in Chile (Schnettler, et al., 2009).

Consumers might perceive that when they buy Halal claimed products, it is the responsibility of the producers and sellers that the products are genuinely Halal. Therefore, a Halal certification should not cost them extra cost. This argument is supported with the fact that almost half (47,1%) of the respondents are not Dutch citizens and come from Muslim-majority countries where Halal certification is not really necessary for unprocessed meat product. However, this may not be plausible as a product certification, particularly from official or international certifiers always incurs extra cost and will be compensated to the price. This reasoning might have the same logic with the study by Angulo et.al. (2005) in which the unwillingness to pay for traceability information to ensure food safety was based on consumer perception that food safety is an inherent attribute of a food product, and there is no reason to pay a higher price to get a safe food product.

Consumers' confidence in Halal certification may also be another reason why they are not willing to pay for it. The confidence towards Halal certifiers, particularly when there is no regulation enforced, may be undermined. The consumers may consider that the certifiers are not trustworthy to assure Halal status. This argument is supported by the finding that place of purchase comes as the third as most important attribute, and sometimes interchangeably with Halal certifier in some sociodemographic variables. This finding indicated that consumers may have greater confidence in Halal stores than certifier itself. It can be a reason because most Muslim consumers believe that when a seller claims to sell a Halal product, it would be their responsibility to provide the righteous products (Bonne & Verbeke, 2007).

## 5.3. Integration of traceability information as a food safety and Halal assurance in Halal meat supply

In the context of food, Halal is always coupled with *tayyiban* which contains the principle of food safety. *Tayyiban* means wholesome and can be manifested in the form of safety, clean, nutritious, and good

quality. Its implementation covers a broad aspect of assurance that food is safe and not harmful for human consumption, for example by avoiding contamination of harmful or toxic ingredients during the food processing. It should be noted that Halal and *tayyiban* are complementing each other rather than an independent concept. Thus, when a product is Halal certified, it should assure that both Halal status and its safety are satisfied.

An established Halal standard, such as MS 1500:2009 from Malaysia, requires hygiene, sanitation and food safety as prerequisites in preparing Halal food. It emphasizes the application of good hygiene practices (GHP), good manufacturing practices (GMP), and other relevant legislation in Malaysia. In addition, aside from its main function as a tool to enhance food safety, HACCP can also be incorporated into a Halal assurance system (Demirci, Soon, & Wallace, 2016). Such concept is used in Malaysia to determine Halal critical control points and similar steps as in HACCP. However, limited studies were conducted to investigate the incorporation of food safety measures in Halal certification. Therefore, the relation between safety aspect and Halal status of Halal labelled product remains unclear (Demirci et al., 2016).

In meat supply chain, traceability information was recognised as a critical tool to assure its safety aspects (Meuwissen, Velthuis, Hogeveen, & Huirne, 2003; Verbeke, 2001). In case a food safety or food fraud issue arises, traceability information is essential to quickly identify the root cause and take proper mitigation measures. However, this study revealed that majority of the respondents were not knowledgeable about traceability information on meat packaging, although they still prefer to have product equipped with traceability information.

In the context of Halal certified meat, adding traceability information into meat packaging can serve two functions, first consumers can justify for themselves if the processes comply with Halal requirements, for example the use of pre-slaughtering stunning, and secondly to assure its safety. Therefore, integrating traceability info into meat packaging can help to make informed decision for both Halal status and food safety.

# 6. Conclusions

A discrete choice experiment was employed to assess the importance of Halal beef attributes, consumers utilities, and WTP for Halal certification. Slaughter method was valued as the most important attribute, followed by Halal certificate, place of purchase, price and traceability information. This order of importance varied between socio-demographics. Place of purchase was valued as the second most important attribute for Dutch consumers, but second least important for non-Dutch consumers. On the contrary, price was perceived as the least important attribute for Dutch consumers, but ranked second most important by non-Dutch consumers. It can be an indication that non-Dutch consumers are more price sensitive than Dutch consumers as non-Dutch consumers have lower income.

The combination of attributes and the desired level makes up an ideal product which serves the highest utilities for the consumers, which is Halal ground beef obtained without pre-slaughtering stunning, with traceability info, available at Halal store, certified by an official certifier, and sold at 2.75 euro per 500 gram. However, WTP estimation revealed that in general consumers were not willing to pay for any level of Halal certification, including the most preferred one. This finding indicates that consumers tend to lose their utility when confronted with price.

Generally, traceability information was the least known attribute and thus valued relatively less important across all socio-demographic variables, although consumers still prefer to have product with traceability info.

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# Appendix

## Appendix A. Trade data for beef in the Netherlands

Table A. 1 Trade balance for meat of bovine animals NL in year 2016

| Partners | Quantity (tonnes) | | Balance in quantity (tonnes) | Values (x1000 Euro) | | Balance in value (x1000 Euro) |
|---|---|---|---|---|---|---|
| | Exported | Imported | | Exported | Imported | |
| World | 433,265 | 368,680 | 64,585 | 2,425,001 | 1,626,253 | 798,748 |

Table A. 2. Comparison between frozen and fresh/ chilled products

| Type of bovine meat | Exported value | Imported value |
|---|---|---|
| Frozen | 8.2% | 12.4% |
| Fresh/chilled | 91.8% | 87.6% |
| Total | 100.0% | 100.0% |

Source: (Trade map- International Trade Statistics, n.d.).

## Appendix B. Questionnaire

**PART 1. Sociodemographic information**

Assalamualaikum,

Before you start, I would like to ask you two questions to see if you are eligible for this survey.

1. Are you a muslim and consume beef? Yes/ No

2. Are you responsible for grocery shopping for yourself and/ or your household (regularly or occasionally)? Yes/No

This survey aims to investigate consumer preferences for Halal beef in the Netherlands. We will ask you questions regarding your preferences when buying Halal beef. All of your answers will remain confidential and for academic purpose only. This survey will take approximately 10-15 minutes.

Voucher reward: There are rewards available for 5 lucky respondents who complete the survey (worth @20 euro VVV gift cards). If you want to participate, please leave your email or phone numbers at the end of the survey.

3. Which city do you live in? (open question)

4. What is your age?

   a.18 – 25   b. 26 – 35   c. 36-45   d. 46-55   e. >55

5. What is your gender?

   a. Female  b. Male

6. Are you a Dutch citizen?

   a. Yes  b. No

   If no, please select one which best describes you:

   a. I hold a Dutch permanent resident

   b. I hold a Dutch temporary resident

   c.  I am an asylum seeker

   d. Other

7. Please indicate your ethnic background:

   (*For example: Native Dutch, Turkish, Moroccan, Suriname, Afghanistan, Indonesian, etc.*)

8. How many people are in your household (including yourself)

   (*Hint: if you are now living by yourself, the answer is 1.*)

9. What is your occupation?

   a. Student  b. Employee  c. Self-employed  d. Housewife  e. Retired  f. Other

10. What is the highest degree or school you have completed?

    (*If currently enrolled, please choose the highest degree completed*)

    a.  no school completed

    b.  elementary education

c. secondary education(VMBO/HAVO/VWO)

d. bachelor degree (HBO/WO)

e. master degree or higher

11. How much is your monthly household income (net)?

a. Less than 1500 euro

b. 1500 – 2500 euro

c. More than 2500 euro

12. How often do you buy Halal beef (in average)?

*(for the purpose of this study, beef here refers to 100% beef meat. Sausages and other processed products are not included).*

a. Once a month  b. 2-3 times per month  c. Once a week  d. More than once a week

13. How many kg of beef do you buy at once (on average)?

a. 250 gr – 500 gr  b. 500 gr – 1 kg  c. 1 – 2 kg  d. > 2 kg

**PART 2. Choice Tasks**

*Imagine that you are going to buy Halal ground beef (rundergehakt) to feed yourself or your families. You have several alternative of Halal ground beef that you can buy. Those alternatives of products differ on these attributes: <u>slaughter method</u>, <u>traceability information</u>, <u>place of purchase</u>, <u>Halal certification</u>, and <u>price</u>.*

<u>Explanation for each attribute :</u> *"This section is useful to help you answering the next questions. Please read carefully"*

1. Slaughter method

In order to obtain Halal meat, an animal has to be slaughtered alive. According to EU law, all farmed animals deemed for human consumption shall be stunned before being slaughtered. The purpose of stunning is to make the animals unconscious and minimise the pain. Exception is granted for religious slaughter including for Halal slaughterhouse.

Opinions in respect of stunning differ among Muslim scholars as well as Halal certifiers. Some muslims object to stunning because of the possibility that the animals might die due to stunning. Some Halal certifiers allow stunning, while some others do not. Both methods of slaughtering, with and without stunning, exist in Halal abattoirs in the Netherlands.

2. Traceability information

EU law obliges that a food business operator should maintain traceability information along the chain. However, not all information is disclosed to consumers on food packaging. Some products may have this information, while many others do not. Traceability information for fresh meat usually include place of animals were born, raised, slaughtered, and cut out.

Part inside the rectangle is an example of traceability info on a beef packaging:

3. Place of purchase

There are at least two places to purchase Halal meat i.e. in Halal stores and supermarkets such as Albert Heijn and Jumbo.

4. Halal certification

In the Netherlands, there are dozens of Halal certifiers which can be distinguished into 3 main categories (van Dalen and van Waarden, 2010):

a. Small certifiers

This category consist of small and often individual certifiers, such as local imams or self-certifier. Local imams certify the products on the basis of personal trust to the producers or sellers. While self-certifier is for example a food business operator who claim that they produce Halal product.

b. Official certification body

Official certification bodies have formal organizational structure and set their Halal standards. Some may adopt and be audited by international certification bodies. They also have websites where consumers can access information from. Examples are Halal Correct, Halal Quality Control, Halal Food and Feed (HVV), Halal International Control (HIC).

c. International certification body

Mostly are Islamic Authority from muslim majority country such as JAKIM (Malaysia), MUI (Indonesia), IFANCA (US), IHI Alliance.

5. Price

Beef price can differ depends on various factors, for example purchasing place, Halal certification, quality, etc.

According to your own knowledge and/ or explanation above, please rate your knowledge about the attributes of Halal beef below:

|  | Poor | Fair | Good | Very good | Excellent |
|---|---|---|---|---|---|
| Slaughter method | ○ | ○ | ○ | ○ | ○ |
| Traceability information | ○ | ○ | ○ | ○ | ○ |
| Place of purchase | ○ | ○ | ○ | ○ | ○ |
| Halal certificate | ○ | ○ | ○ | ○ | ○ |
| Average Price | ○ | ○ | ○ | ○ | ○ |

Next, you will be presented 18 choice sets which consist of two alternatives of product. You are asked to choose one which best matches your preference. You can choose neither of the alternative, if they do not represent your preferences at all. Please consider **"none"** as the last option by examining the other options in a good manner. There is no right or wrong answer, all answers matter and will contribute to the success of this study.

*In this study, it is important that you select an alternative product, as if you are in real situation when you are going to buy the product and spending a certain amount of money. You should take into account your budget constraint, and remember that spending money for the product means that you will have less money for other purchases[5].*

*Task 1*. If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | Yes | No | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | Small certifier | Small certifier | |
| Price per 500 gram | 3,25 euro | 2,75 euro | |
| | ○ | ○ | ○ |

*Task 2*. If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | Yes | No | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | Official certifier | Small certifier | |
| Price per 500 gram | 3,75 euro | 2,75 euro | |
| | ○ | ○ | ○ |

*Task 3*. If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | No stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | Yes | Yes | |
| Place of purchase | Halal stores | Supermarkets | |
| Halal certificate | International certifier | International certifier | |
| Price per 500 gram | 3,25 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 4*. If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | No stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | No | Yes | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | Official certifier | Small certifier | |
| Price per 500 gram | 2,75 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 5*. If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | No | Yes | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | International certifier | Official certifier | |
| Price per 500 gram | 3,75 euro | 3,25 euro | |
| | ○ | ○ | ○ |

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[5] Cheap talk

*Task 6.* If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | NONE: I wouldn't choose any of these. |
| Traceability information | No | Yes | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | Official certifier | Small certifier | |
| Price per 500 gram | 2,75 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 7.* If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | NONE: I wouldn't choose any of these. |
| Traceability information | Yes | No | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | International certifier | International certifier | |
| Price per 500 gram | 3,25 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 8.* If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | No stunning | No stunning | NONE: I wouldn't choose any of these. |
| Traceability information | No | No | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | International certifier | Official certifier | |
| Price per 500 gram | 3,25 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 9.* If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | Yes | Yes | |
| Place of purchase | Halal stores | Supermarkets | |
| Halal certificate | Small certifier | Official certifier | |
| Price per 500 gram | 3,25 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 10.* If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | NONE: I wouldn't choose any of these. |
| Traceability information | No | Yes | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | International certifier | Small certifier | |
| Price per 500 gram | 3,25 euro | 3,25 euro | |
| | ○ | ○ | ○ |

*Task 11.* If these were your only options, which would you choose?

| | | | |
|---|---|---|---|
| Slaughter method | No stunning | With stunning | NONE: I wouldn't choose any of these. |
| Traceability information | Yes | No | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | Official certifier | Official certifier | |
| Price per 500 gram | 3,75 euro | 2,75 euro | |
| | ○ | ○ | ○ |

*Task 12.* If these were your only options, which would you choose?

| | | | NONE: I wouldn't choose any of these. |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | |
| Traceability information | Yes | No | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | International certifier | International certifier | |
| Price per 500 gram | 3,75 euro | 3,75 euro | |
| | ◯ | ◯ | ◯ |

*Task 13.* If these were your only options, which would you choose?

| | | | NONE: I wouldn't choose any of these. |
|---|---|---|---|
| Slaughter method | With stunning | With stunning | |
| Traceability information | Yes | No | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | International certifier | Small certifier | |
| Price per 500 gram | 3,75 euro | 2,75 euro | |
| | ◯ | ◯ | ◯ |

*Task 14.* If these were your only options, which would you choose?

| | | | NONE: I wouldn't choose any of these. |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | |
| Traceability information | Yes | Yes | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | Official certifier | Official certifier | |
| Price per 500 gram | 3,75 euro | 3,75 euro | |
| | ◯ | ◯ | ◯ |

*Task 15.* If these were your only options, which would you choose?

| | | | NONE: I wouldn't choose any of these. |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | |
| Traceability information | Yes | Yes | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | International certifier | International certifier | |
| Price per 500 gram | 3,75 euro | 3,25 euro | |
| | ◯ | ◯ | ◯ |

*Task 16.* If these were your only options, which would you choose?

| | | | NONE: I wouldn't choos of these. |
|---|---|---|---|
| Slaughter method | With stunning | With stunning | |
| Traceability information | No | No | |
| Place of purchase | Halal stores | Supermarkets | |
| Halal certificate | Official certifier | Small certifier | |
| Price per 500 gram | 3,75 euro | 2,75 euro | |
| | ◯ | ◯ | ◯ |

*Task 17.* If these were your only options, which would you choose?

| | | | NONE: I wouldn't choose any of these. |
|---|---|---|---|
| Slaughter method | No stunning | No stunning | |
| Traceability information | Yes | Yes | |
| Place of purchase | Halal stores | Halal stores | |
| Halal certificate | Official certifier | Small certifier | |
| Price per 500 gram | 3,75 euro | 3,25 euro | |
| | ◯ | ◯ | ◯ |

*Task 18.* If these were your only options, which would you choose?

| | With stunning | No stunning | NONE: I wouldn't choose any of these. |
|---|---|---|---|
| Slaughter method | With stunning | No stunning | |
| Traceability information | No | No | |
| Place of purchase | Supermarkets | Halal stores | |
| Halal certificate | Small certifier | Small certifier | |
| Price per 500 gram | 2,75 euro | 2,75 euro | |
| | ○ | ○ | ○ |

This is the end of the survey, I would like to thank you for your time and participation. If you have any remark or feedback, please write it on the section below.

## Appendix C. Socio-demographic information

Table C. 1. Distribution of gender, age, and education (% to total respondents)

| Gender | Age | No school completed | Elementary education | Secondary education (VMBO/HAVO/VWO) | Bachelor (HBO/WO) | Master degree or higher | Total (age) |
|---|---|---|---|---|---|---|---|
| Female | 18 - 25 | 0% | 0% | 9% | 14% | 2% | 25% |
| 69% | 26 - 35 | 0% | 0% | 5% | 12% | 8% | 25% |
| | 36 - 45 | 0% | 0% | 3% | 8% | 3% | 15% |
| | > 45 | 0% | 0% | 2% | 2% | 0% | 4% |
| | | | | | | | |
| Male | 18 - 25 | 0% | 0% | 3% | 2% | 0% | 6% |
| 31% | 26 - 35 | 0% | 0% | 2% | 7% | 7% | 15% |
| | 36 - 45 | 0% | 0% | 1% | 3% | 5% | 9% |
| | > 45 | 0% | 0% | 0% | 0% | 0% | 1% |
| Total (education) | | 0% | 0% | 24% | 48% | 27% | 100% |

Table C. 2. Distribution of citizenship, age, and occupation (% to total respondents)

| Dutch Citizenship | Age | Student | Employee | Self-employed | Housewife | Retired | Other | Total (citizenship) |
|---|---|---|---|---|---|---|---|---|
| Dutch | 18 - 25 | 16% | 4% | 0% | 1% | 0% | 0% | 21% |
| 52.89% | 26 - 35 | 1% | 11% | 2% | 3% | 0% | 1% | 18% |
| | 36 - 45 | 0% | 6% | 3% | 1% | 0% | 2% | 12% |
| | > 45 | 0% | 1% | 1% | 0% | 0% | 0% | 2% |
| | | | | | | | | |
| Non-Dutch | 18 - 25 | 8% | 1% | 0% | 0% | 0% | 0% | 10% |
| 47.11% | 26 - 35 | 14% | 4% | 0% | 3% | 0% | 1% | 22% |
| | 36 - 45 | 3% | 5% | 0% | 2% | 0% | 1% | 12% |
| | > 45 | 0% | 2% | 0% | 1% | 0% | 0% | 3% |
| Total (occupation) | | 43% | 33% | 7% | 12% | 0% | 5% | 100% |

Table C. 3. Distribution of citizenship, household member and income (% to total respondents)

| Citizenship | HH income | Household member | | | | | Total (income) |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | |
| Dutch | less than € 1,500 | 3% | 3% | 2% | 4% | 6% | 18% |
| 53% | € 1,500 – € 2,500 | 0% | 2% | 5% | 7% | 7% | 21% |
| | more than € 2,500 | 0% | 1% | 2% | 5% | 5% | 14% |
| | | | | | | | |
| Non-Dutch | less than € 1,500 | 11% | 2% | 2% | 1% | 5% | 20% |
| 47% | 1,500 – € 2,500 | 3% | 2% | 5% | 4% | 2% | 17% |
| | more than € 2,500 | 1% | 2% | 2% | 4% | 1% | 10% |
| Total (HH member) | | 18% | 12% | 18% | 25% | 26% | 100% |

# Appendix D. Consumer utilities

Table D. 1. Relative importance of Halal beef attributes (N= 242)

| Attribute | Mean | Standard deviation | Standard error |
|---|---|---|---|
| Slaughter method | 0.390 | 0.220 | 0.014 |
| Halal certificate | 0.182 | 0.116 | 0.007 |
| Place of purchase | 0.181 | 0.146 | 0.009 |
| Price | 0.133 | 0.141 | 0.009 |
| Traceability info | 0.114 | 0.106 | 0.007 |

Table D. 2. Part-worth utility score for each attribute level

| Attribute | Level | Mean | Standard deviation | Standard error |
|---|---|---|---|---|
| Slaughter method | With stunning | -87.29 | 70.11 | 4.51 |
| | Without stunning | 87.29 | 70.11 | 4.51 |
| | | | | |
| Traceability info | Yes | 28.53 | 26.57 | 1.71 |
| | No | -28.53 | 26.57 | 1.71 |
| | | | | |
| Place of purchase | Halal store | 45.3 | 36.63 | 2.35 |
| | Supermarket | -45.3 | 36.63 | 2.35 |
| | | | | |
| Halal Certificate | Small certifier | -28.83 | 44.76 | 2.88 |
| | Official certifier | 14.98 | 38.45 | 2.47 |
| | International certifier | 13.85 | 40.40 | 2.60 |
| | | | | |
| Price | 2.75 euro | 33.28 | 37.73 | 2.40 |
| | 3.25 euro | -0.03 | 19.15 | 1.23 |
| | 3.75 euro | -33.25 | 35.77 | 2.30 |